

**KENWOOD**

HI/FI STEREO COMPONENTS

# SERVICE MANUAL

## KW-6044



**3 HEAD SURROUND SONIC STEREO TAPE DECK**

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# SPECIFICATIONS

## NUMBER OF HEADS:

- 3 Heads: 4 Track 2 Channel Erase
- 4 Track 2 Channel Record
- 4 Track 4 Channel Playback

## RECORD/PLAYBACK SYSTEM:

- 4 Track 4 Channel Playback
- 4 Track STEREO/MONO Recording and playback

## TAPE SPEEDS:

- 7  $\frac{1}{2}$  ips. (19 cm/sec.)
- 3  $\frac{3}{4}$  ips. (9.5 cm/sec.)
- 1  $\frac{7}{8}$  ips. (4.75 cm/sec.)

## REEL SIZE:

- Standard NAB 7" maximum

## FREQUENCY RESPONSE:

- 20–20,000 Hz at 7  $\frac{1}{2}$  ips. (19 cm/sec.)
- 30–15,000 Hz at 3  $\frac{3}{4}$  ips. (9.5 cm/sec.)
- 40– 7,000 Hz at 1  $\frac{7}{8}$  ips. (4.75 cm/sec.)

## SIGNAL TO NOISE RATIO:

- Better than 47 dB at 3  $\frac{3}{4}$  ips.

## HARMONIC DISTORTION (Pre-amp.):

- Less than 0.5 % at 0 dBs (0.775V)

## WOW AND FLUTTER:

- Less than 0.12 % at 7  $\frac{1}{2}$  ips. (19 cm/sec.)
- Less than 0.18 % at 3  $\frac{3}{4}$  ips. (9.5 cm/sec.)
- Less than 0.25 % at 1  $\frac{7}{8}$  ips. (4.75 cm/sec.)

## RECORDING TIME (Within 1800 feet tape):

- One hour 30 minutes at 7  $\frac{1}{2}$  ips. (19 cm/sec.)
- Three hours at 3  $\frac{3}{4}$  ips. (9.5 cm/sec.)
- Six hours at 1  $\frac{7}{8}$  ips. (4.75 cm/sec.)

## FAST WIND/REWIND TIME:

- Within 150 sec. with 1200 feet tape.

## LEVEL INDICATION:

- Four VU Meters
- RECORD: Standard Recording Level at 0 VU
- PLAYBACK: 0 dB Line Output at 0 VU

## INPUTS:

- 2 Microphone Input Jacks
  - Sensitivity: -63 dBs (0.55mV)
  - Input Impedance: 50 K ohms (optimum microphone 10~50 K ohms)
- 2 Line Input Jacks
  - Sensitivity: -18 dBs (100mV)
  - Input Impedance: 100 K ohms

## OUTPUTS:

- 4 Line Output Jacks
  - Output Level: 0 dBs (0.775V)
- Headphone Jack:
  - Output Level: -28 dBs (30mV)
  - Impedance: 8 ohms

## DIN CONNECTOR:

- Input Side:
  - Sensitivity: -38 dBs (9.8mV)
- Output Side:
  - Output Level: 0 dBs (0.775 V)

## EQUALIZER:

- NAB Standard

## SEMI-CONDUCTORS:

- 28 Transistors and 10 Diodes

## OPERATING POSITION:

- Horizontal or vertical

## OTHER SPECIAL FEATURES:

- Four Luminous VU Meters
- Tape Selector Switch
- Four-digit Automatic Counter with Reset Button
- Playback Mode Switch
- Automatic Shut-off
- Front - Rear Switch for Headphone

## DIMENSIONS:

- 16" (W) x 15  $\frac{1}{2}$ " (H) x 7" (D)
- 416 mm (W) x 398 mm (H) x 175 mm (D)

## WEIGHT:

- 24.2 lbs.(11 kilograms)

## POWER REQUIREMENTS:

- 100–120–230–250 V, 55 watts

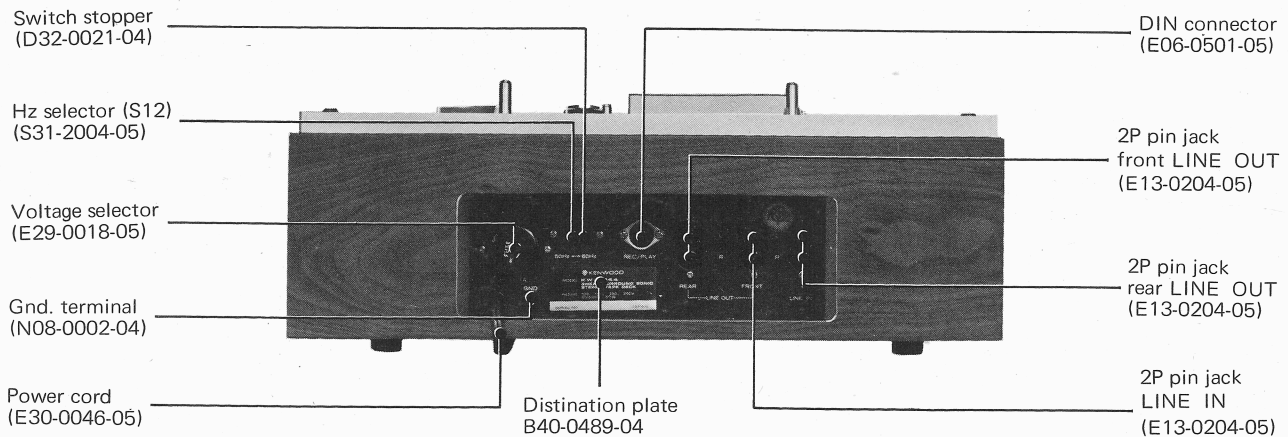
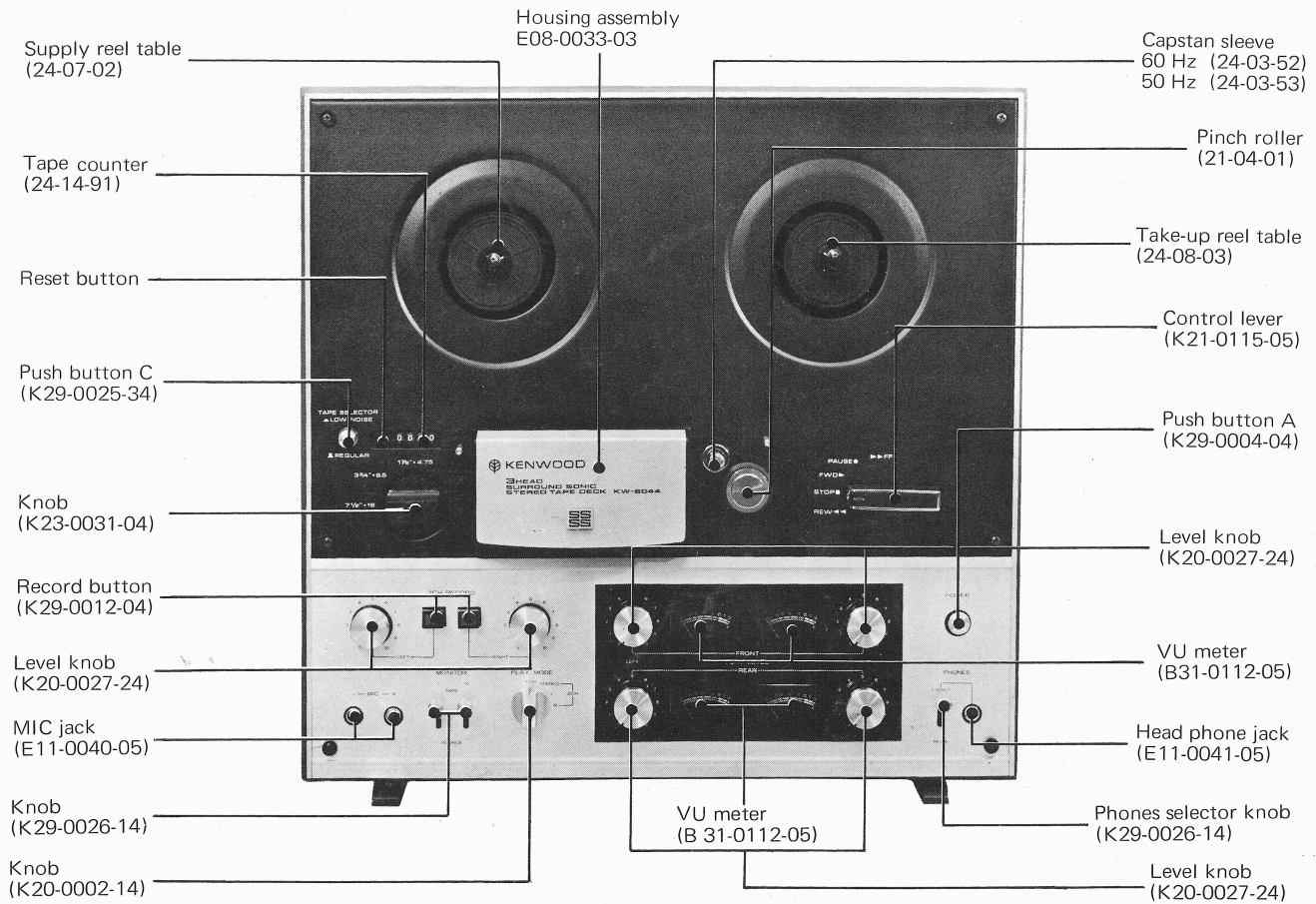
## SUPPLIED ACCESSORIES:

- Extra 7" Reel
- 3 Connecting Cords
- 2 Reel Adjusting Discs
- 2 Reel Caps

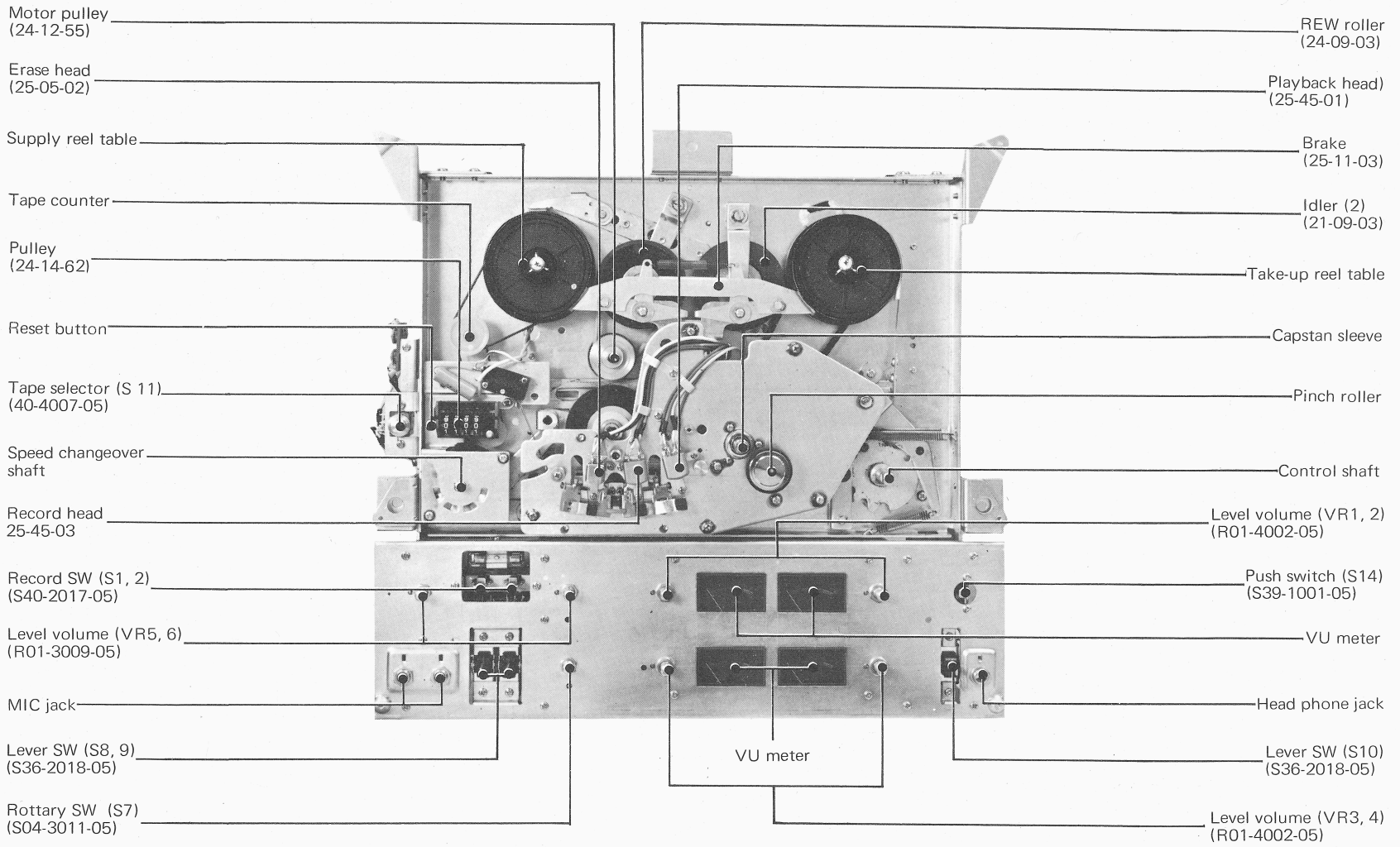
## OPTIONAL ACCESSORIES:

- Plastic Dust Cover SR-22

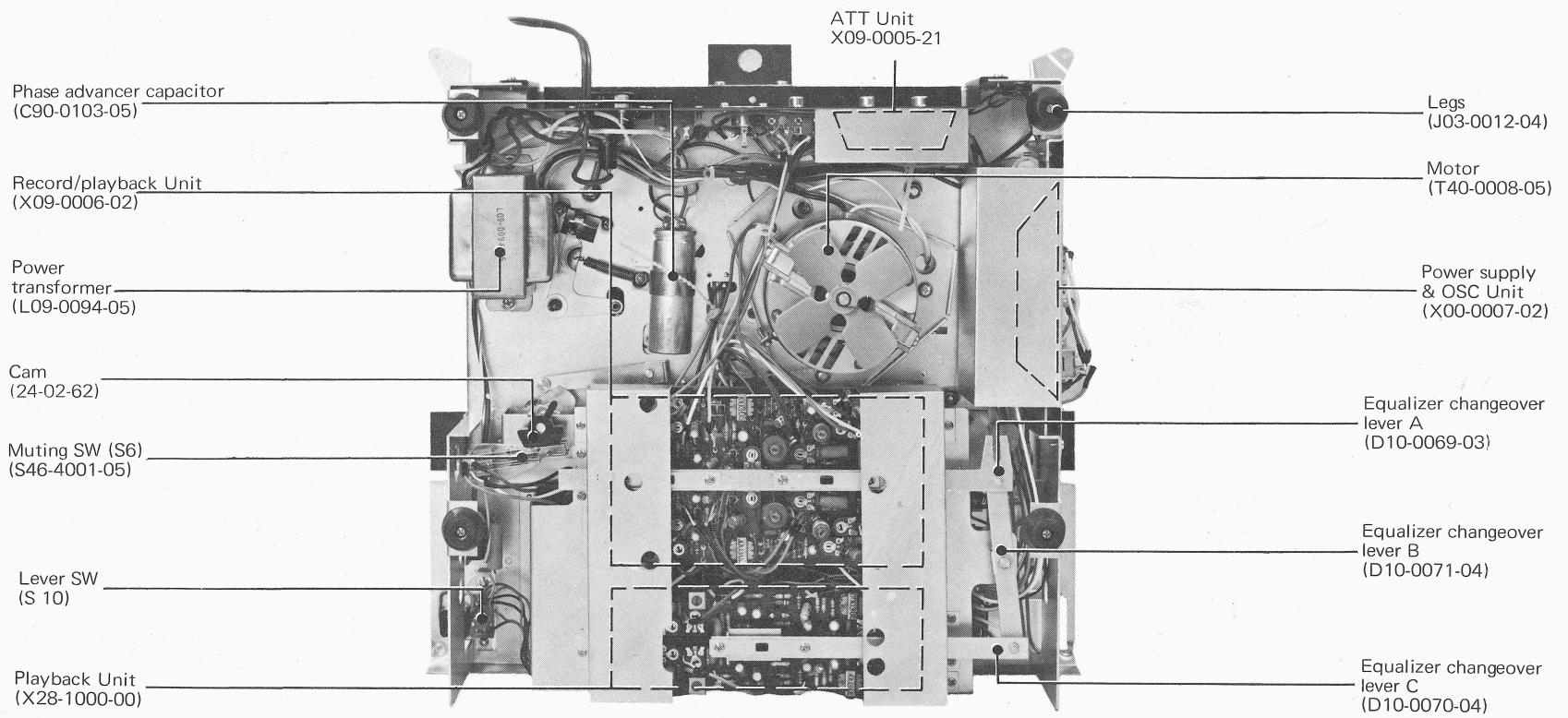
# EXTERNAL VIEW



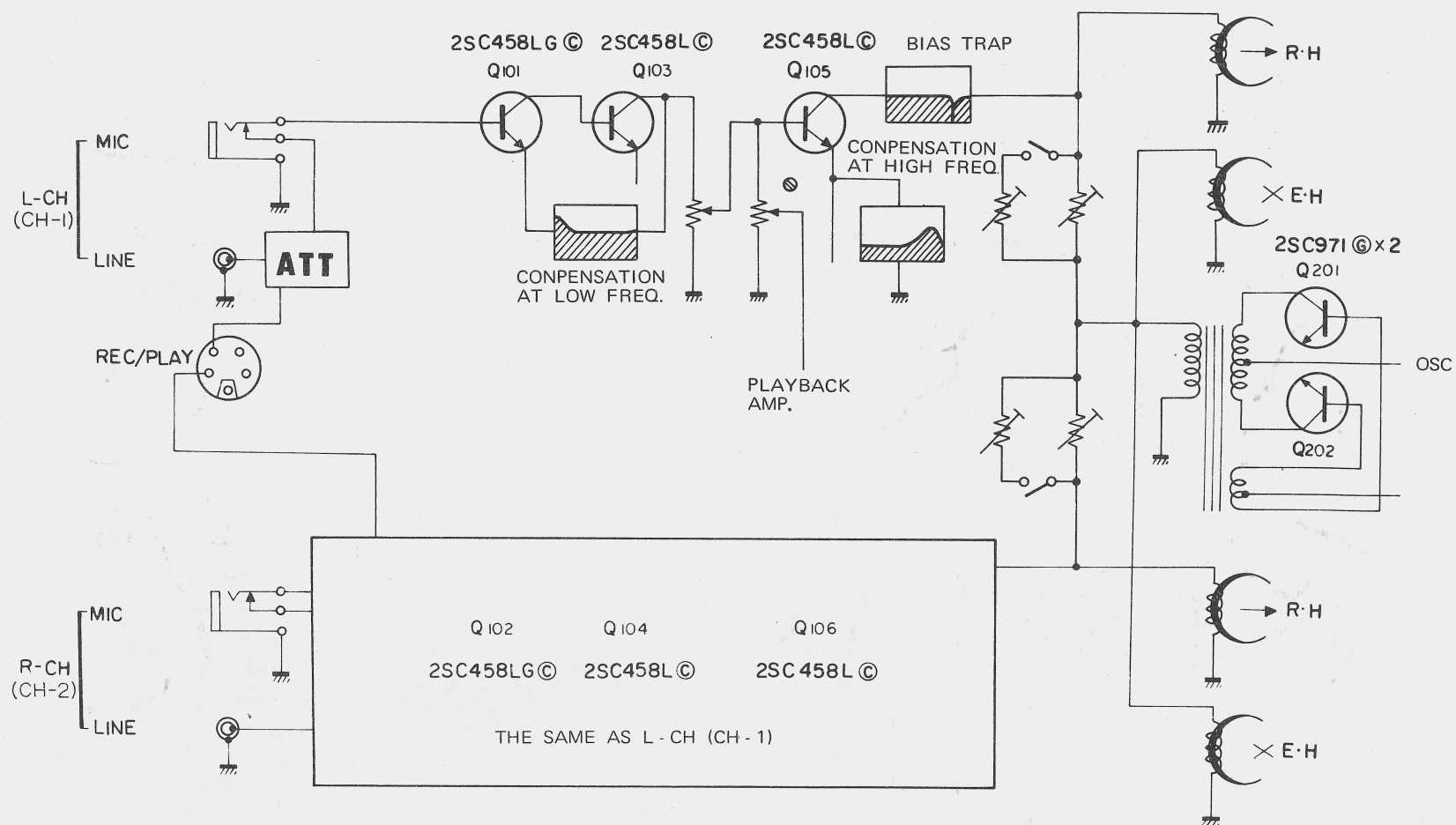
# TOP CHASSIS VIEW



# BOTTOM CHASSIS VIEW

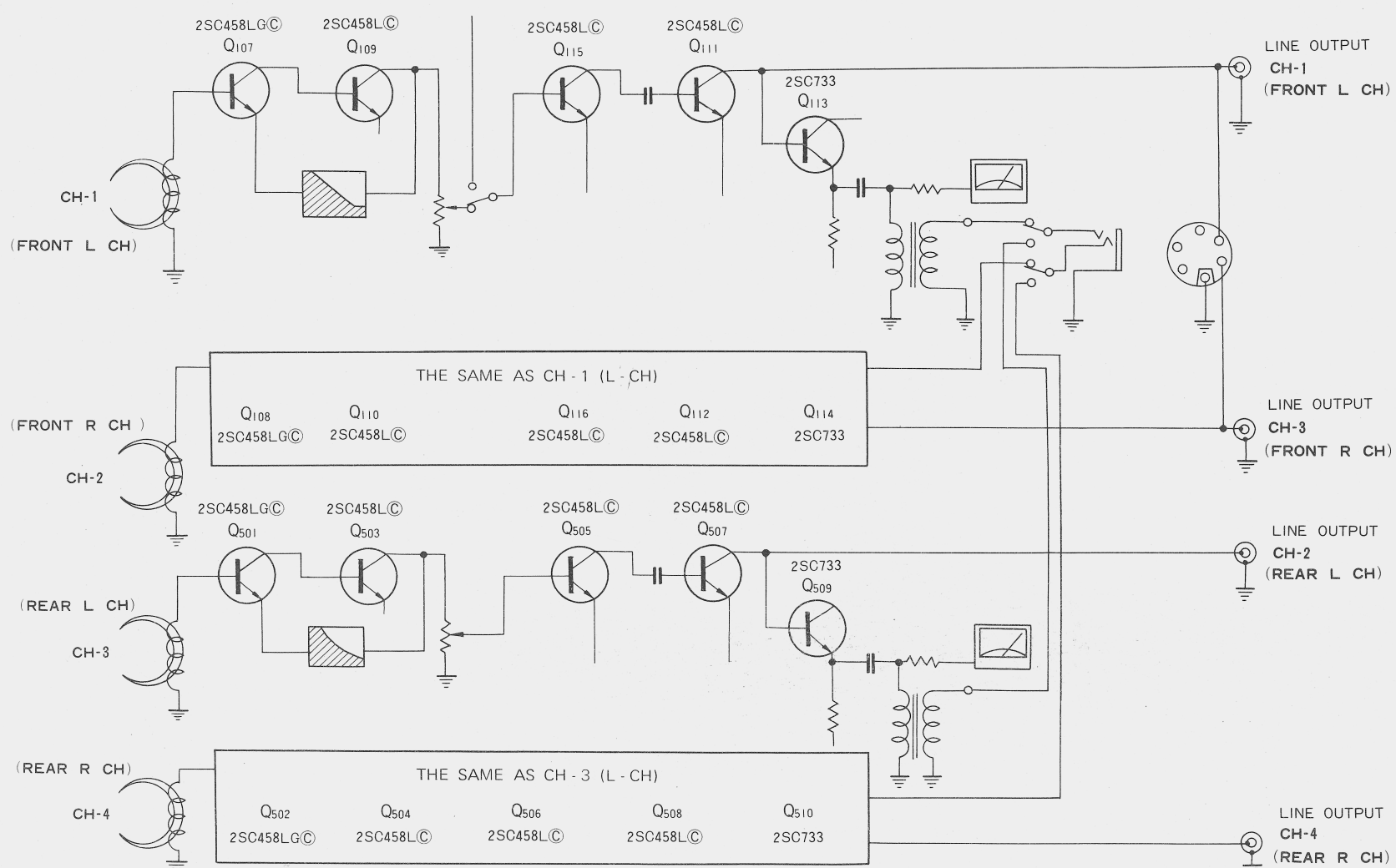


# RECORD

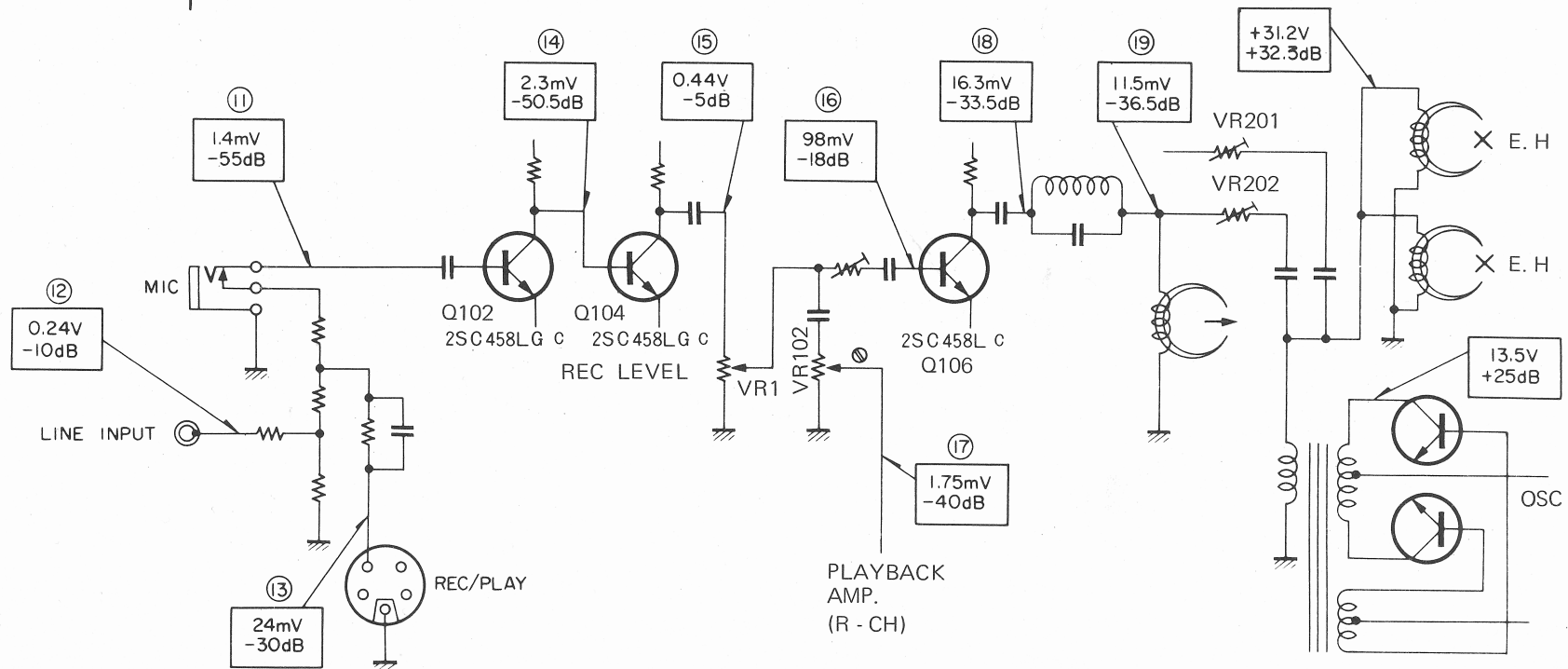
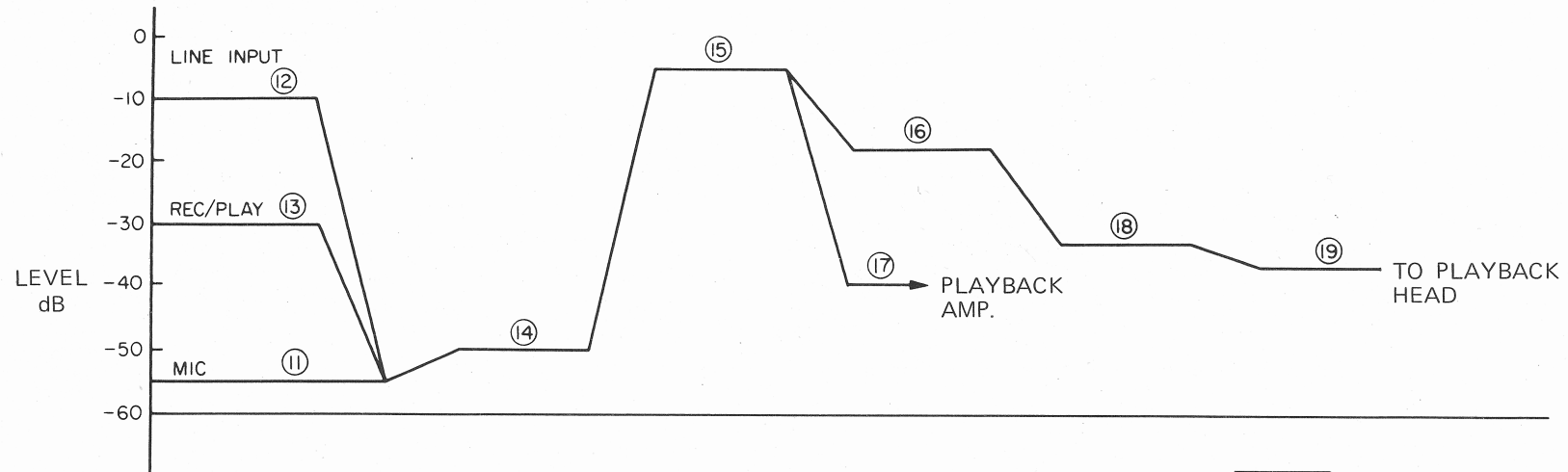


## BLOCK DIAGRAM

# PLAYBACK

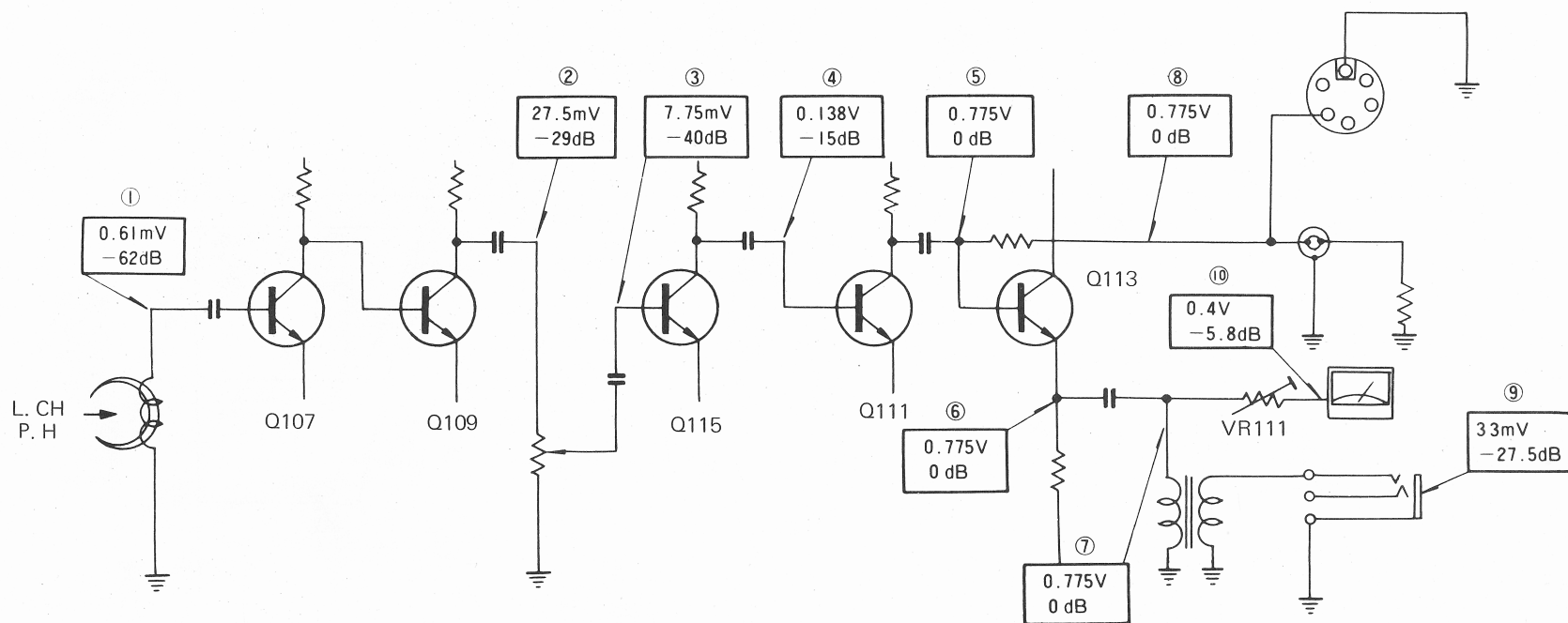
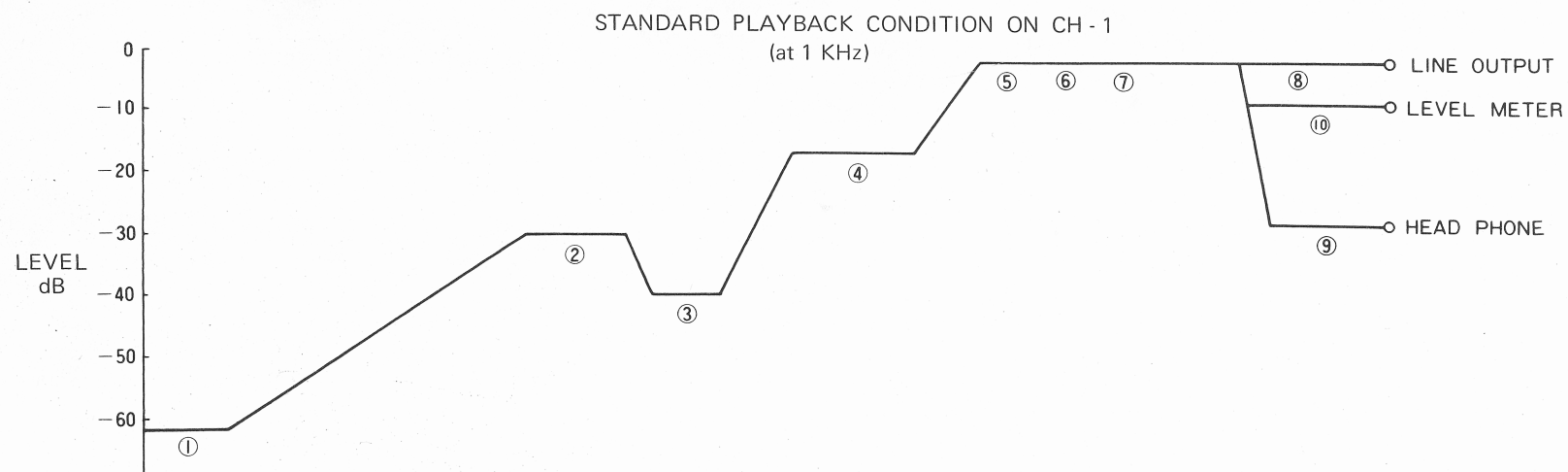


STANDARD RECORD CONDITION ON CH - 2  
(at 1 KHz)



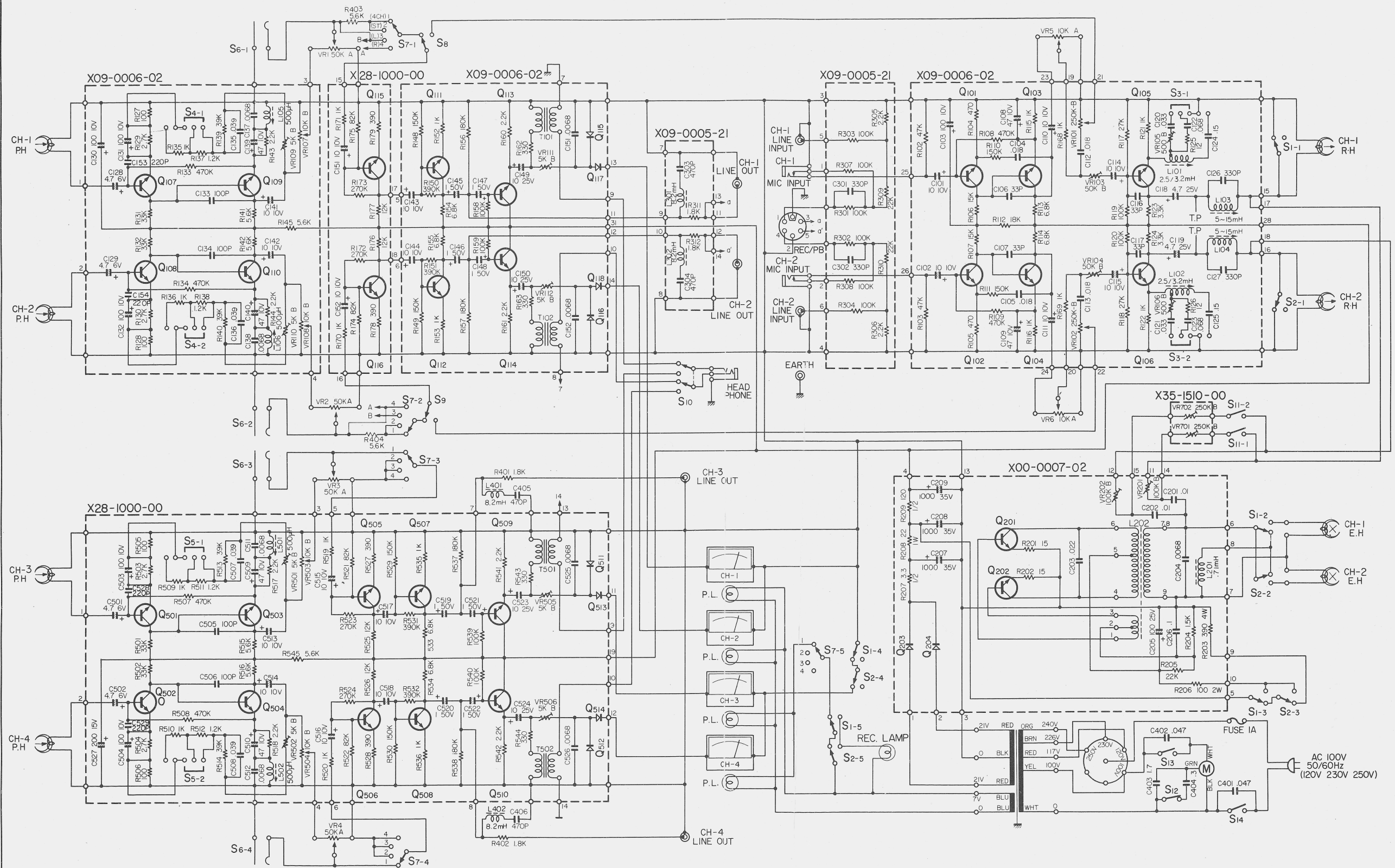
LEVEL DIAGRAM







# SCHEMATIC DIAGRAM



Q101, 102, 107, 108, 501, 502 : 2SC458LG © or 2SC631-71  
 Q103 ~ Q106, Q109 ~ Q112 : 2SC458L ©  
 Q115, Q116, Q503 ~ Q508

Q113, 114, 509, 510 : 2SC733  
 Q115 ~ 118, 511 ~ 514 : 1N60  
 Q201, 202 : 2SC971 ©  
 Q203, 204 : SM150-01

S1 : CH-1 RECORDING SW (PLAYBACK POSITION)  
 S2 : CH-2 RECORDING SW (PLAYBACK POSITION)  
 S3 : RECORDING EQ SW (19cm/sec POSITION)  
 S4 : PLAY BACK EQ SW (19cm/sec POSITION)

S5 : PLAY BACK EQ SW (19cm/sec POSITION)  
 S6 : MUTING SW (OFF POSITION)  
 S7 : MODE SW 4CH. ST. L.R. (4CHANNEL POSITION)  
 S8 : CH-1 MONITOR SW (TAPE POSITION)  
 S9 : CH-2 MONITOR SW (TAPE POSITION)

S10 : HEAD PHONE SW (FRONT POSITION)  
 S11 : TAPE SELECTOR SW (REGULAR POSITION)  
 S12 : 50/60Hz SW (50Hz POSITION)  
 S13 : AUTOMATIC STOP SW (OFF POSITION)  
 S14 : POWER SW (OFF POSITION)

KW-6044

# OPERATION

Fig. 1 shows an explanatory view giving relative positions of various levers, and idlers with respect to control lever being in the STOP Position.

## 1. STOP

With cam plate and lever 2, the pinch roller is segregated from the capstan, and the pad from the head. The tape shifter is projected in front of the head. Idler 1 is not brought against motor pulley and flywheel, and REW roller and idler 2 are set free to move from side to side. The brake comes in touch with supply reel table and take-up reel table. Speed can be changed arbitrarily because the speed changeover mechanism is released from lever 4.

## 2. FWD

With control lever set at a required position, set the machine at FEW, and through the medium of cam plate and lever 2, pinch roller will be brought against capstan, and pad against the head. Thus, the tape shifter will fall backward of the head. Brake will be released from reel table through the medium of lever 1 and lever 3. Also backtension 2 is released from the reel table, but backtension 1 alone remains in contact with the reel table. Idler 1 is brought against motor pulley and flywheel by the force of coil spring 3, whereby the motor drive force is communicated from motor to motor pulley, idler 1, flywheel, square belt and take-up reel table in the said order.

Other REW roller and idler 2 are held in the same position as in the case of STOP, and have nothing to do with the FWD position. During FWD, the speed changeover mechanism is locked by lever 4, and cannot be meddled with.

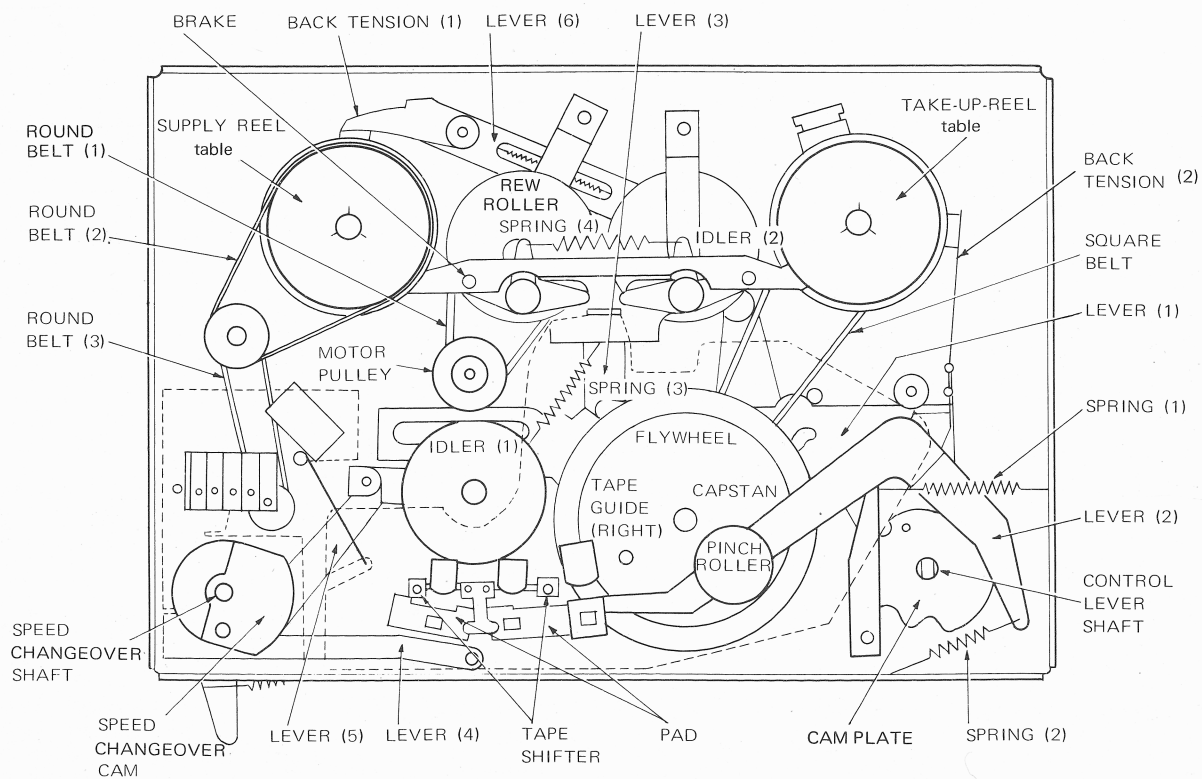


Fig. 1

### 3. PAUSE

When the control lever is set at PAUSE, pinch roller and pad are segregated from capstan and head respectively through the medium of cam plate and lever 2. (Clearance is less than in the case of STOP.) Tape shifter, however, is left backward away from the head. The brake functions just in the same way as in the case of FWD. While idler 1, REW roller and idler 2 are in the same position as in the case of FWD, take-up reel table cannot run because the disc (felt) of take-up reel table (to be explained later) is released. During PAUSE, speed changeover cannot be made.

### 4. FAST FORWARD

When control lever is set at F. F. pinch roller, pad and tape shifter resume just the same conditions as in the case of STOP. Brake is released through the medium of lever 1 and lever 3 from supply reel table and take-up reel table. Whereas backtension 1 and backtension 2 are held in close contact with motor pulley and flywheel as in the case of FWD, REW roller gets shifted rightwards through the medium of lever 1 and lever 6, getting idler 2 brought in contact with take-up reel table.

Thus, power is transmitted from motor to motor pulley, round belt 1, REW roller, idler 2 and take-up reel table in the said order. Simultaneously with this, power is also transmitted to motor pulley, idler 1, flywheel, square belt, take-up reel table and disc (felt) in turn. Since the disc (felt) of take-up reel table has been released, the power transmission through these two different routes cannot be compounded at take-up reel table.

### 5. REWIND

When control lever is set at REW, pinch roller, pad and tape shifter assume the same conditions as in the case of STOP. Just as in the case of F. F. brake is released from reel table, and backtension 1 from supply reel table through the medium of lever 1 and lever 6. But, backtension 2 is applied onto take-up reel stronger than is in the case of STOP. On the other hand, idler 2 is in the same position as in the case of STOP, and the power is communicated from motor to motor pulley, round belt 1, REW roller and supply reel table in the said order.

### 6. SPEED CHANGEOVER MECHANISM

Fig. 2 shows a drawing of the speed changeover mechanism (7-1/2, 3-3/4, 1-7/8 ips). The said figure refers to 3-3/4 ips. By turning speed changeover cam set on the speed changeover shaft, elevator shaft is moved up or down. (stroke:5.5 mm) Thus, idler 1 caulked to elevator shaft through the medium of lever 5 is moved up or down along with the movement of elevator shaft.

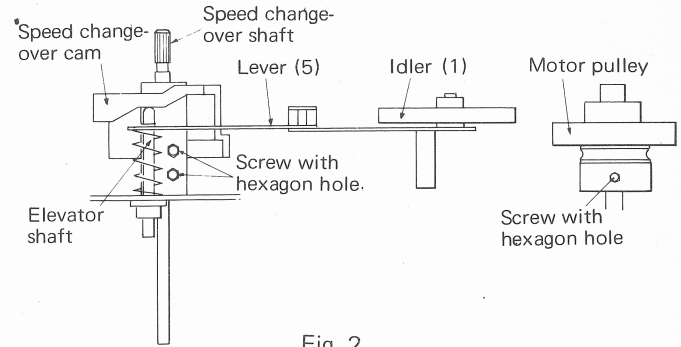


Fig. 2

### 7. RECORD LOCK MECHANISM

Fig. 3 shows a drawing of the record lock mechanism viewed from the back of the machine. When control lever is set at STOP, lock lever attached to pushbutton switch is depressed by the function of lever 7, spoke and lever 8 through the medium of record lock cam set on the control lever shaft, making its internal mechanism actuated. (See full line)

When control lever is changed from STOP to FWD, the record lock mechanism functions to establish the state shown by broken line. Similarly, by the selection of PAUSE, F. F. and REW, the states of broken line, full line and full line are established respectively. (Note that the positions of record lock cam changes by states.)

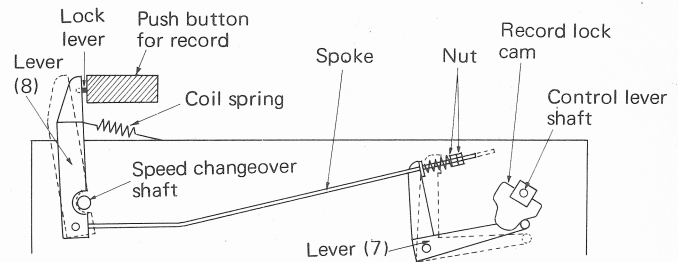


Fig. 3

### 8. EQUALIZER CHANGEOVER MECHANISM

Fig. 4 shows a back view of the equalizer changeover mechanism. The movement of equalizer changeover cam set on speed changeover shaft is communicated to equalizer changeover switch through changeover lever.

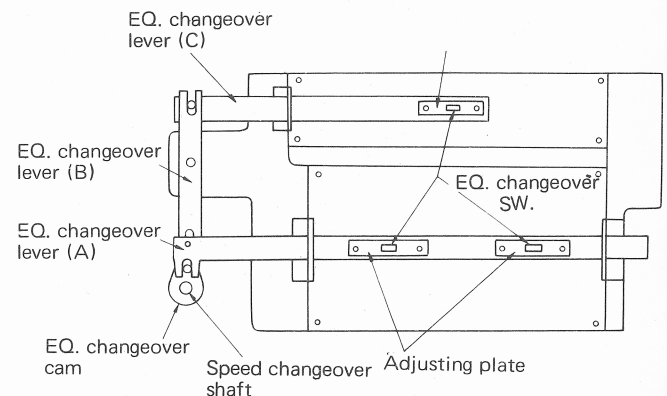


Fig. 4

## 9. TAPE COUNTER

The tape counter used is a pushbutton reset type decimal four-digit counter which can be reset to "0" by one-touch action. Turn of reel table is communicated to intermediate pulley through the medium of round belt 2, which drives the counter pulley to register the number of revolutions of the reel table on tape counter. (See Fig. 1)

## 10. AUTOMATIC SHUT - OFF MECHANISM

Fig. 5 shows a drawing of the shut-off mechanism. The tube is filled up with silicon grease of some #500,000. Arm of the shut-off mechanism is smoothly driven by the dragging force of the grease. The position of arm is shown in Fig. 5 with respect to ON-OFF operation of the switch.

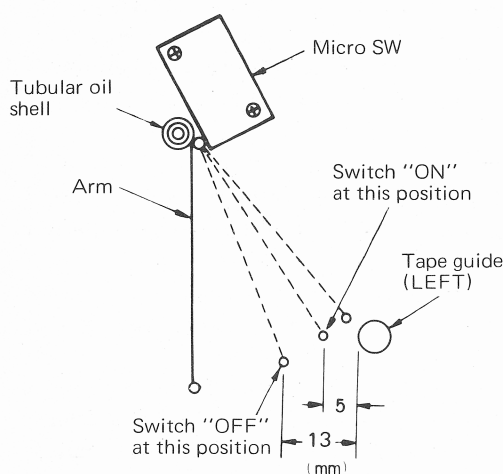


Fig. 5

## 11. REW ROLLER SLIP MECHANISM

Fig. 6 shows REW roller slip mechanism. The driving force of motor is communicated by means of round belt 1 to pulley, and the upper roller is thereby turned by the friction force of slip ring (24-09-31). The effect of this ring is regulated by the pressure of coil spring.

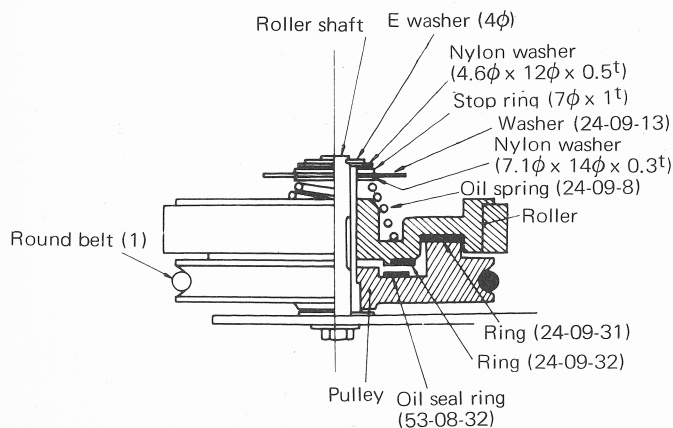


Fig. 6

# ADJUSTMENT OF MECHANISM

## 1. Brake adjustment

No particular adjustment is required for the brake of this machine. It may happen, however, that the following procedures be taken when the brake ratio gets out of order by soiled brake lining. (Fig. 7)

Remove E-washer from both sides which have secured the brake, and pull the brake out. Clear the foreign objects of brake lining with a piece of gauze moistened with alcohol, or replace it with a new one. In time with this, clean side faces (with which the lining gets in contact) of the both reel tables.

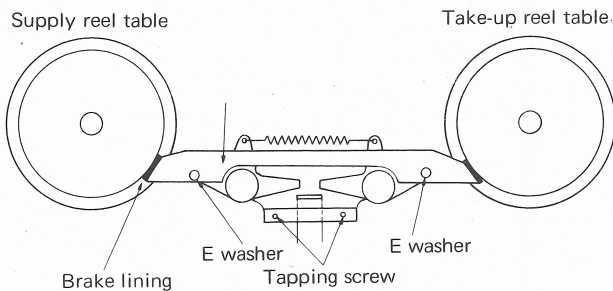


Fig. 7

## 2. Adjustment of winding torque

Fig. 8 shows a structural view of the take-up reel table. In a FWD state, lever 9 which has been locked by lever 10 is released, and is thrust up with A as a fulcrum, whereby pulley and disc are brought in close contact with each other to drive take-up reel by square belt. The standard winding torque ranges from 160 g-cm to 400 g-cm. If the running is found irregular, wear of disc, abnormal contact between disc and pulley, and improper torque (too strong or too weak) are suspected.

### a) Torque adjustment

The torque can be adjusted by means of coil spring which is accessible from the back of the machine.

### b) Replacement of take-up reel table and disc

Remove brake first. (Refer to item 1 "Brake adjustment.") Remove truss screw and polyslider washer from take-up reel shaft, pull reel table out, and renew disc.

### c) Replacement of pulley

After step b) above, remove polyslider washer and E washer from the intermediate section of the reel shaft, and take pulley away while disengaging square belt.

### d) Adjustment of reel table thrust play

The reel table thrust play can be adjusted by adjusting the thickness of polyslider washer on the upper part of reel shaft. The thrust play should be larger than 0 but not in excess of 0.3 mm.

## 3. Adjustment of backtension

In a FWD state, backtension can be obtained by the close contact of supply reel table to felt as illustrated in Fig. 9.

### a) Adjustment of backtension

The backtension can be adjusted by means of coil spring.

### b) Replacement of supply reel table

Remove the brake. (Refer to item 1 "Brake adjustment.") Remove truss screw and polyslider washer from supply reel table shaft, and take-up reel table off while disengaging round belt 2 for counter driving.

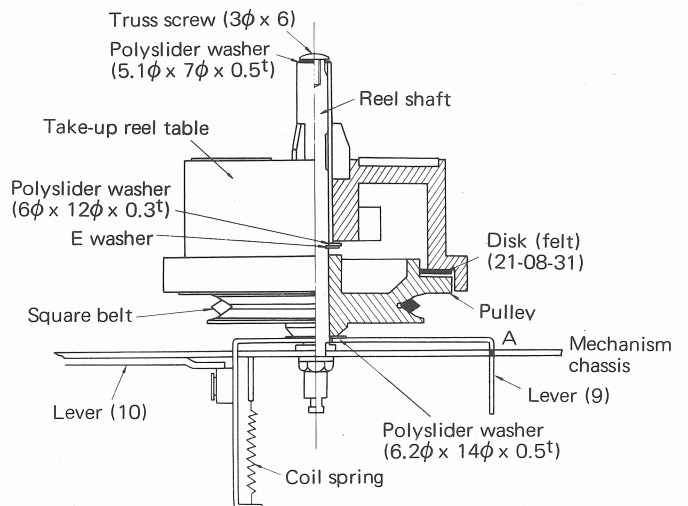


Fig. 8

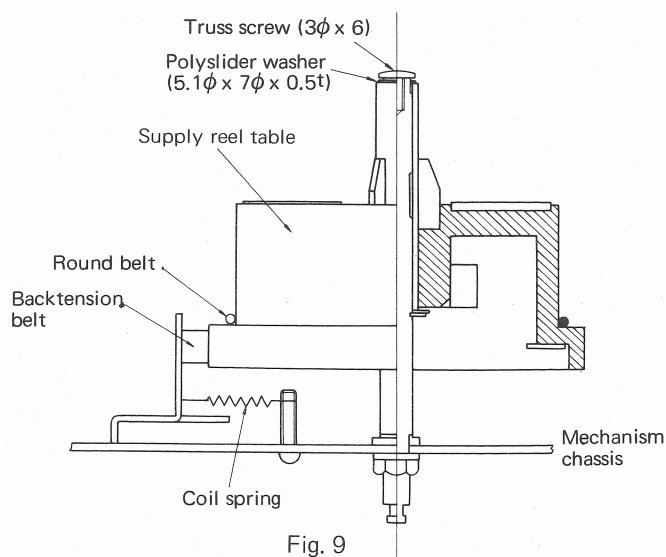


Fig. 9

#### 4. Adjustment of thrust play of the flywheel

##### a) Thrust play adjustment

As will be clear from Fig. 10, the thrust play in the axial direction of flywheel is expressed in terms of gap between nylon washer on flywheel and housing of head panel. It is required to be less than 0.5 mm as standard. If the thrust play is increased excessively, it could cause troubles, and the adjustment is needed. Replace 0.3 mm nylon washer shown in Fig. 10 with a suitable nylon washer, or lay another washer over 0.3 mm washer.

In either way, the thrust play should not be reduced to zero.

##### b) Replacement of flywheel and square belt

Flywheel must be demounted before replacing the thrust play adjusting washer and square belt. Follow the steps explained below. (Refer to Figs. 1 and 10) Remove setscrew from capstan, and remove capstan sleeve, cap and oil seal rubber washer in the said order. After removal of spring 1 and spring 2 shown in Fig. 1, remove five setscrews from head panel. With the entire head panel being raised, pull flywheel out downward while disengaging the square belt. Thus, the replacement of either thrust play adjusting washer or flywheel or both can be accomplished. After replacement and reassembling, thoroughly clean square belt with alcohol.

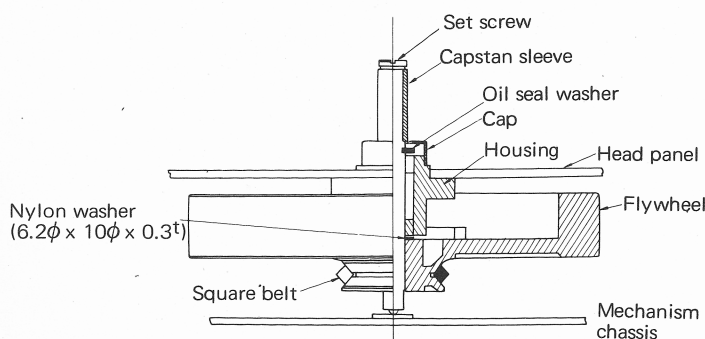


Fig. 10

#### 5. Adjustment of pinch roller pressure

The standard pressure of pinch roller is 2.65 lbs. The reduction of pressure should be regulated as occasion demands.

#### 6. Adjustment of equalizer changeover mechanism adjusting plate

Explained here is a method of adjusting the adjusting plate of the equalizer changeover mechanism under item 9 (p. 12). Fig. 4 shows a state of changeover mechanism with respect to the case where the speed changeover shaft is set at 3-3/4 ips. With this, loosen screws on both sides of the adjusting plate, and move the adjusting plate so that equalizer changeover point may come at the center. Then fix the adjusting plate in that position.

#### 7. Adjustment of automatic stop

The "ON" and "OFF" states of the switch are shown in Fig. 5. The switch can be adjusted with Phillips head screw of microswitch loosened. The belated action of arm is sometimes ascribe to (1) jamming-up of the spring-shaped end of the arm with the inner walls of the tube or (2) too sticky silicon grease. In the latter case, it is recommended to replace silicon grease with low-viscosity one after removal of arm. (after some #200,000 to 300,000 operations of use)

#### 8. Parallelism between pinch roller and capstan

If the tape flops while running on the pinch roller and capstan, the parallelism between pinch roller and capstan is suspected to be out of order. If the flopping is found to have nothing to do with parallelism, remove decorative screw and rollers (see Fig. 11), and adjust roller disc with long-nosed side-cutting pliers or other suitable means. Pay attention not to damage roller shaft.

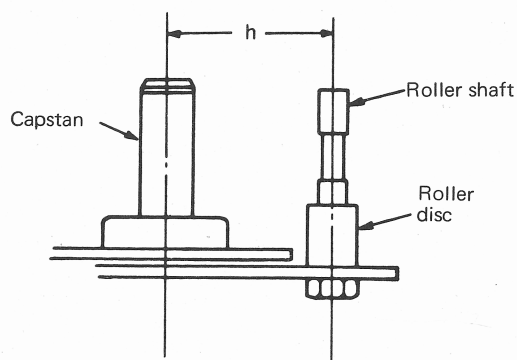


Fig. 11



## 9. Adjustment of motor pulley height

Fig. 12 shows a dimensional relationship between motor pulley of the speed changeover mechanism shown in Fig. 2 and idler 1. Since idler 1 has a vertical stroke of 5.5 mm; namely, the height of motor pulley can be adjusted in the manner that  $h_1$  ( $h_2$ ) in Fig. 12 may come within the range from 0 to 0.5 mm (0.5 to 1 mm). After adjustment set the pulley with a screw. In setting pulley, bring the tip of the setscrew in the slot on the motor shaft.

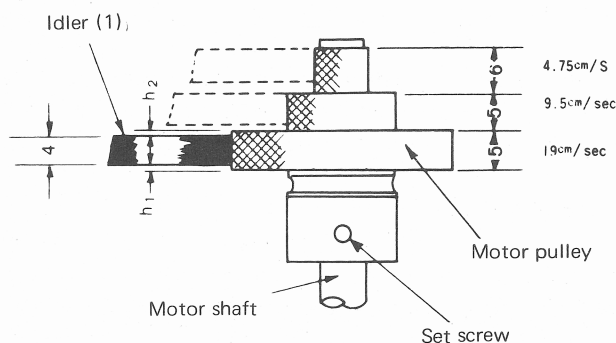


Fig. 12

## 10. Adjustment of record lock mechanism

Fig. 13 is a detailed view of lever 7 and record lock cam shown in Fig. 3. The record lock mechanism can be adjusted by adjusting record lock cam so that the lever 7 may attain Fig. 13 pattern in a STOP state. Make sure by depressing record switch button (if hard to depress, strengthen coil spring) that the record operation is possible. Then, with record button held depressed, set control lever at FWD, and the record lock cam will turn, and make lever 8 which has held lock lever work through the medium of lever 7 and spoke, until it is locked. If lever 8 fails to lock, tighten up nuts (two pieces) shown in Fig. 3 to the extent that lock lever is almost brought in contact with lever 8 under FWD conditions.

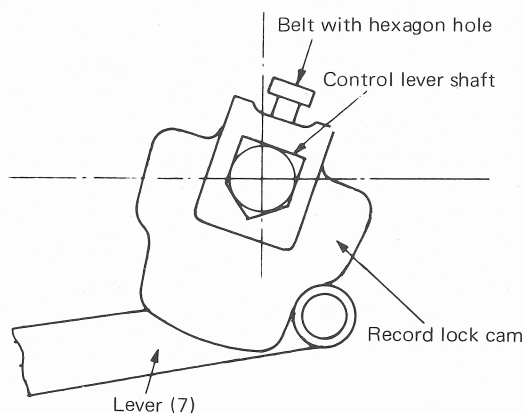


Fig. 13

## 11. Replacement of REW roller (Refer to Figs. 1, 6 and 7)

- Replacement of REW roller  
Remove five screws from head panel, and make the whole head panel assembly raised a little. (It is recommended to remove spring 1, spring 2 and spring 3 shown in Fig. 1 beforehand.) Remove two tapping screws which have secured the brake mechanism to chassis (see Fig. 7), and take out the whole brake mechanism. After removal of E-washer and nylon washer from REW roller shaft, pull out the REW roller while disengaging round belt from motor.
- Adjustment of REW roller slip  
After step a) above, change the position of stop ring (shown in Fig. 6) to adjust the roller slip.
- Replacement of slip ring (24-09-31)  
After step a) above remove stop ring, nylon washer and ordinary washer, and separate roller from pulley to replace ring.

## 12. Replacement of idler 1 (See Fig. 1)

Set speed changeover knob and control lever at specified positions respectively. With speed change knob at 7-1/2 ips, set control lever at FWD. Then, remove E-washer from idler, and pull idler out upwards.

## 13. Replacement of idler 2

Remove the whole brake mechanism assembly first. (See item 11) After removal of E-washer nylon washer from lever onto which idler 2 is set, remove idler 2 together with lever. Then, remove E-washer from idler to replace.

## 14. Positional adjustment and replacement of tape counter

- Positional adjustment  
Loosen two pan-headed screws which have secured tape counter from the back of the mechanism, and adjust tape counter position.
- Replacement  
Disengage round belt 3 from intermediate pulley and tape counter pulley, and remove two screws from the back of the mechanism to replace tape counter with a new one.

# INITIAL ADJUSTMENT OF ELECTRIC CIRCUIT

## 1. TEST EQUIPMENT REQUIRED

The test equipment required for adjustment of KW-6044 are as shown in the table below.

Name	Rating	Remarks
AF oscillator	Frequency range 20-20,000 Hz Output impedance 600Ω	
High sensitivity VTVM	Measuring range 1mV ~ 300V (Full scale) Input impedance 1MΩ or more	
Oscilloscope		General use
Distortion factor meter	Frequency range 20-100,000 Hz Measuring range 0.3 ~ 100% (Full scale)	
Frequency counter	Measuring range 20-100,000 Hz	

Measuring tape and other

TEST TAPE Ampex #31321-01 or its equivalent

Measuring tape 3M SCOTCH #150

Head demagnetizer

## 2. GENERAL CAUTIONS

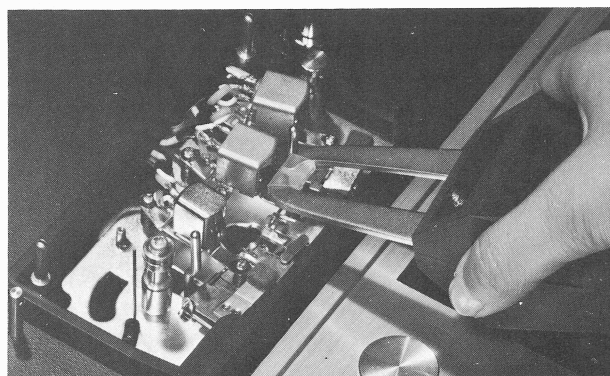
- When making adjustment of the electric circuit of tape deck through the use of a TEST TAPE, it is necessary to demagnetize the playback, record and erase heads of the deck beforehand. This is intended to protect the high frequency signal recorded on the TEST TAPE from being erased by a magnetized head.
- Demagnetize the metallic tools beforehand when they are used for repairs or adjustment of the tape deck. Use the non-metallic or non-magnetic tools, if possible.

## 3. ADJUSTMENT OF A HEAD AND PAD

Demagnetizing a head

Turn the POWER switch to OFF and place the control lever in the STOP. Connect the head demagnetizer to the

AC line available. Hold the head demagnetizer in hand and bring the tip of demagnetizer near the head core while taking care not to strike or rub the surface of the core with the tip of demagnetizer. Position the tip of demagnetizer at the right angle to the vertical gap and slowly move the tip up and down several times along the gap. Then, gently move the demagnetizer away from the head. (See photo next)



Adjustment of head angle

- Adjustment of head about contact and height

The KW-6044 is shipped after it is adjusted thoroughly and, therefore, requires no readjustment. When a head is replaced with a new head, however, it becomes necessary to adjust the head against the tape guide pin about its height and tilt and azimuth angles. In general, the playback, record and erase heads have different track widths. That is, the playback head has a track width 0.1 to 0.2 mm narrower than that of the record head, while the erase head has a track width 0.2 to 0.5 mm wider than that of the record head. The accuracies of the above-mentioned track widths of heads are on the order of 1/100 mm. First, visually adjust the head to an appropriate position about the height and tilt in accordance with Fig. 14.

- Adjustment of Playback Head (See Fig. 14)

Reproduce the TEST TAPE from its portion which carries the signal for tape's height adjustment (3 kHz — 7-1/2 ips, 500 Hz — 3-3/4 ips) and adjust screws A and B so that every channel provides the maximum output level. Then reproduce the tape from its portion which carries the signal for tape's azimuth adjustment (15 kHz — 7-1/2 ips, 7.5 kHz — 3-3/4 ips) and

adjust azimuth adjustment screw C so that every channel provides the maximum output level.

**Note 1:** If the output level is lowered greatly when the pad is disengaged from the playback head while reproducing the tape carrying the signal for head's azimuth adjustment, then it is necessary to adjust the head about its contact pressure (tilt).

**Note 2:** If the heads for both channels offer the outputs deviated greatly despite of the fact that the heads provide the same frequency characteristic in each channel, set the adjustment screws so that the heads provides the output compromised to each other.

**Note 3:** If the azimuth adjustment screw is turned 2~3 complete turns during the azimuth adjustment, then readjust adjustment screws A and B again.

c) Adjustment of Record Head

Record a 3 kHz signal on the tape by a record head in reference to the playback head already adjusted. Reproduce the above tape and adjust adjustment screws A and B until the head provides a maximum playback output. Then, record a signal (15 kHz — 7-1/2 ips, 7.5 kHz — 3-3/4 ips) on the tape by the same record head and using that tape, adjust azimuth adjustment screw C until the head provides a maximum playback output. Adjust the head about its contact to the tape lest it should lower the output level greatly when the pad is disengaged from the pad.

d) Adjustment of Erase Head

Record a 1 kHz, -10dB signal on a tape and, while reproducing the tape, check that the deck provides a playback output level of about 0dB. Then, erase that portion of the tape which carries the above signal and measure the output level during the erasing operation using a band-pass filter. Adjust the erase head by means of adjustment screws A and B and azimuth adjustment screw C until the measured level offers a ratio of more than 60dB to the 0dB playback output level.

**Note:** Pay attention not to allow the erase head to erase the signals recorded on the 4th and 2nd tracks (or the 3rd and 1st tracks) of the tape during the erasing of the signals recorded on the 3rd and 1st tracks (or the 4th and 2nd tracks).

e) Adjustment of Pad

Adjust the pad as follows so that it is brought in uniform contact with the surface of its associated head:

Loosen two screws fixing the pad to the pad plate. Adjust the pad until it is positioned properly against the surface of head about its front-rear position and the left and right contact angle. During adjustment of the pad for the playback head, be careful not to allow the metal portion of the pad to be brought in touch with the shield case of the head. Also, pay attention under the STOP condition not to allow the pad to protrude above the housing base and offer a trouble for loading the tape.

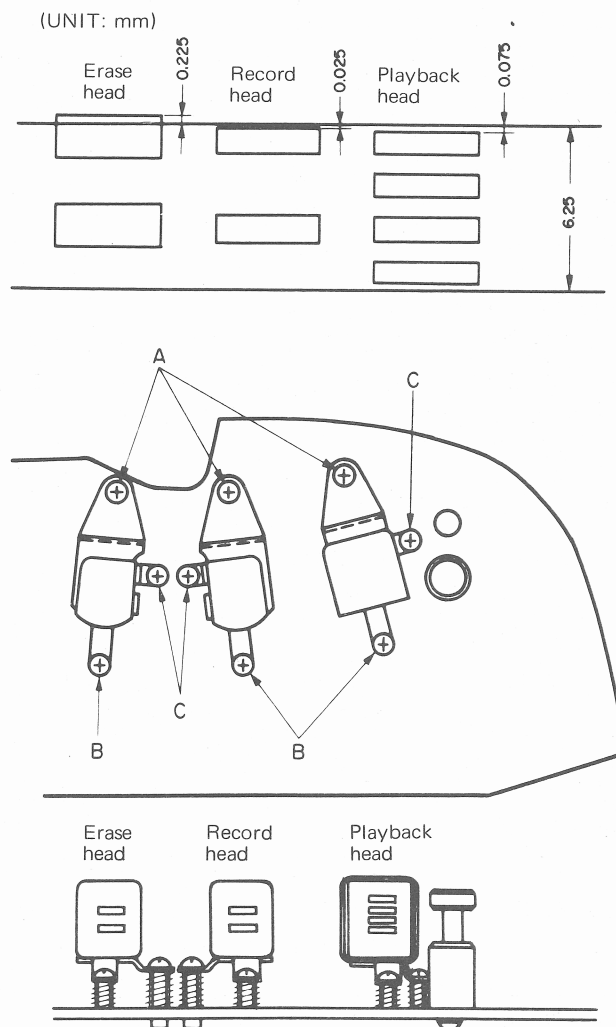
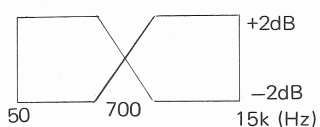


Fig. 14

# TABLE OF ADJUSTMENT & MEASUREMENT

## ■ ADJUSTMENT OF PLAYBACK SYSTEM

Item	Measuring Procedure	Standard
The standard playback condition.	Reproduce the 700Hz (0dB) portion of the "TEST TAPE" and set the VR107, 108 (10k $\Omega$ ), so that the output level is 0dB.	
Frequency response.	Reproduce the 15kHz (-10dB) and set the potentiometer VR109, 105 (5k $\Omega$ ) so that the output level is the same of the 700Hz (-10dB). Next reproduce the 700Hz (-10dB) as the standard level and then measure the deviation in each frequency.	
Meter level.	Reproduce the 700Hz (0dB) portion of the TEST TAPE and set the potentiometer VR111, 112 (5k $\Omega$ , CH-1, CH-2), VR503, 504 (10k $\Omega$ CH-3, CH-4) so that meter indicate the 0 VU.	
Measurement of signal to noise ratio.	In condition of item "Meter level", check the output level. Next reproduce the blank recorded tape and check the output. And then compare the latter with the former. <b>If you measure the signal to noise ratio without auditory correction circuit, the value degrades 3dB.</b>	More than 45dB

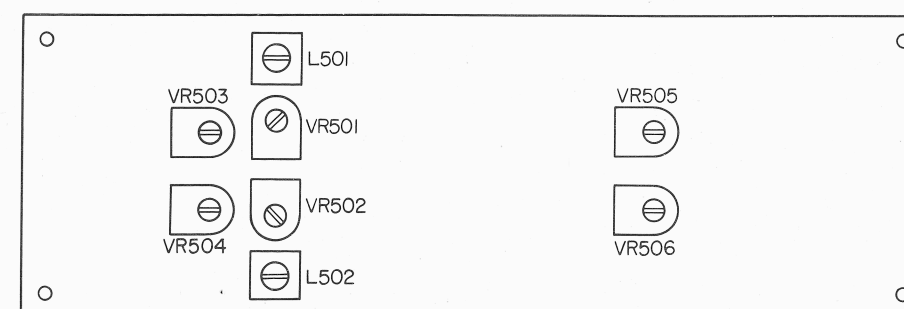
## ■ ADJUSTMENT OF RECORDING SYSTEM

Item	Measuring Procedure	Standard
Adjustment of NAB curve.	Connecting the resistor 10 $\Omega$ to the record head directly. Feed the 1kHz (-10dB) to the line input and set REC LEVEL control so that the output across the resistor is 0.775mV (-60dBs). At 3-3/4 ips, adjust the core in L101, 102 so that the 10kHz increasing +16dB with 1kHz. At 7-1/2 ips, set the potentiometer VR105, 106 (500 $\Omega$ ) so that the 15kHz increasing +12dB with 1kHz.	Disconnect the lead at terminal number 10 in PC Board X00-0007-02. The peak is round 18kHz at 7-1/2 ips, 12kHz at 3-3/4 ips and 7kHz at 1-7/8 ips.
Adjustment of bias.	Feed the 1kHz (-10dB) to the line input and set the potentiometer VR201, 202 (100k $\Omega$ ) so that bias is set at point -0.5dB from the peak point at excessive bias side.	
Adjustment of maximum input sensitivity.	Feed the 1kHz (-10dB) to the line input and set the potentiometer VR103, 104 so that the output level of record and playback is 1.95V (+8dB). REC LEVEL control is maximum.	
Adjustment of standard record input sensitivity.	Feed the 1kHz (-10dB) to the line input and set the REC LEVEL control so that the output level of record and playback is 0.775V (0dB).	

Item	Measuring Procedure	Standard
Adjustment of frequency response.	Feed the 1kHz (−30dB) to the line input, check the output level to be −20dB. Next feed the 15kHz and set the potentiometer VR105, 106 (500Ω) so that output level is that of 1kHz as the same, check the response to meet the standard in each tape speed.	
Adjustment of the standard record level.	Feed the 1kHz (−10dB) to the line input and set the potentiometer VR103, 104 (50kΩ) so that the output level is 0dB.	
Adjustment of source level.	Feed the 1kHz (−10dB) to the line input and set the MONITOR to the SOURCE, set the potentiometer VR101, 102 (250kΩ) so that the VU meter indicates the 0 VU.	
Check the RECORD level.	<p>Feed the 1kHz (−10dB) to the line input and set the MONITOR to the SOURCE. And then check the VU meter to be 0 VU.</p> <p>Setting the bias as the above, it can't adjust the frequency response and standard in this case, position the bias at point within 1dB from the peak point at excessive bias side.</p> <p>On record, set the standard playback condition.</p>	

## ADJUSTMENT PARTS LOCATION

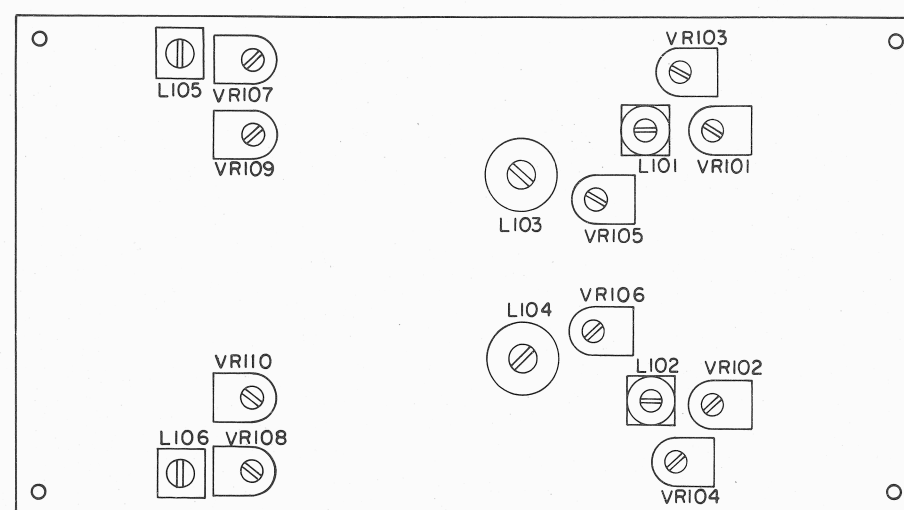
### ▼ PLAYBACK (REAR AMP.) UNIT X28 - 1000 - 00



### ■ MEASUREMENT OF RECORDING SYSTEM

Item	Measuring Procedure	Standard
Measurement of signal to noise ratio.	Record the 700Hz (−10dB), reproduce it and check its output level. With no input signal, do the above measurement. Then, compare the latter with the former.	More than 40dB
Cross talk.	<p><b>Between channel:</b> Record the 1kHz (−10dB) to the CH-1 or CH-2, and no input to the CH-2 or CH-1. Next reproduce and compare the latter and the former.</p> <p><b>Between track:</b> Record the 100Hz (−10dB) to the 1 and 3 track (or 2, 4). Next interchange reels, reproduce the 4 and 2 track (or 1, 3) and measure the output level.</p>	<p>More than 40dB</p> <p>More than 25dB</p>
Erase effect.	<p>Record the 1kHz (−10dB) and measure the output level. Next, erase the 1kHz signal (−10dB) In this measurement, use the band-pass filter.</p> <p>If you measure the signal to noise ratio without auditory correction circuit the value degrades 3dB.</p>	<p>More than 60dB</p> <p>(Erasing 4 tracks)</p>

### ▼ RECORD / PLAYBACK (FRONT AMP.) X09 - 0006 - 02



## BLOCK DIAGRAM FOR MEASUREMENT

### 1. Tape speed and wow and flutter

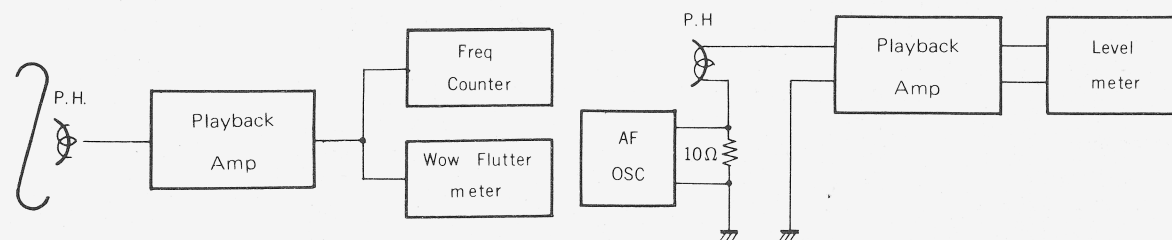
$$\text{Error (\%)} = \frac{f_1 - f_0}{f_0} \times 100$$

$f_0$  = Record signal frequency of the test tape.

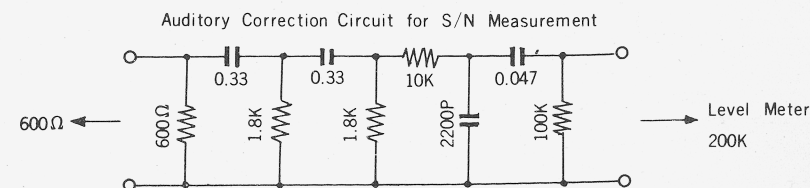
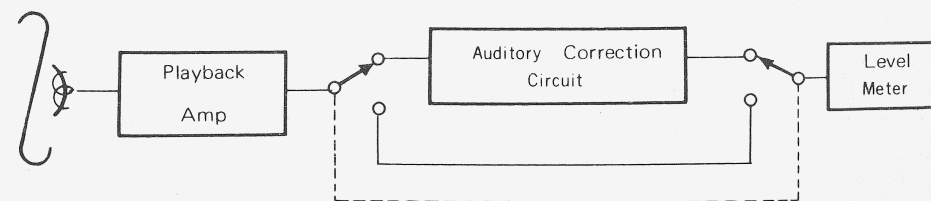
$f_1$  = Frequency of the signal reproduced from the test tape.

### 2. Measurement of playback amplifier gain and equalization characteristic

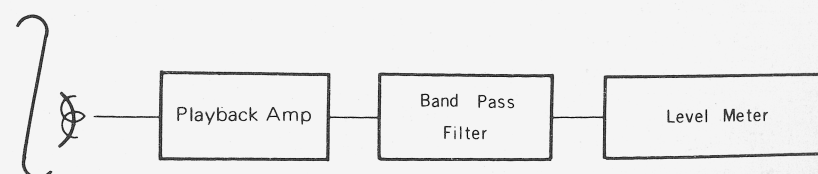
All frequencies at a level of -50dB are used for measurement of equalizer characteristic.



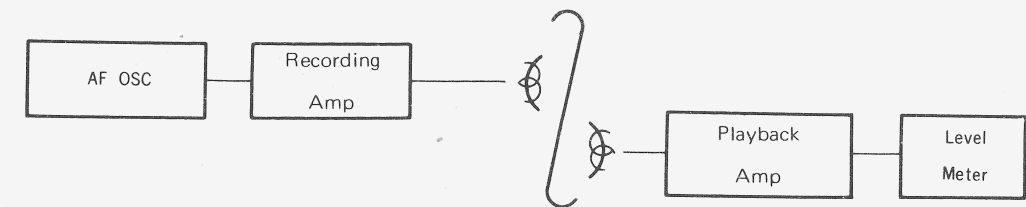
### 3. S/N ratio



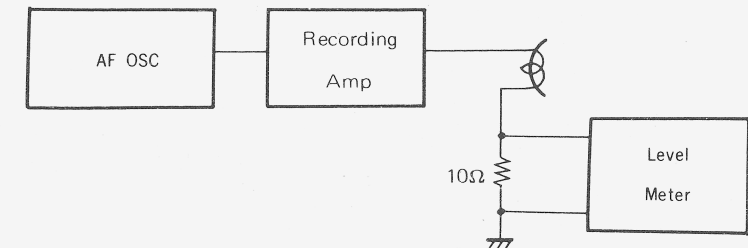
### 4. Crosstalk (playback)



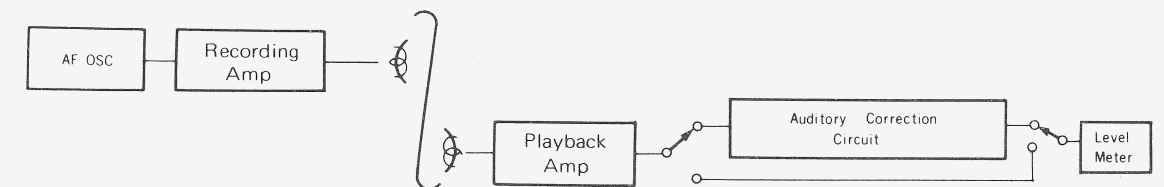
### 5. Record/playback frequency response



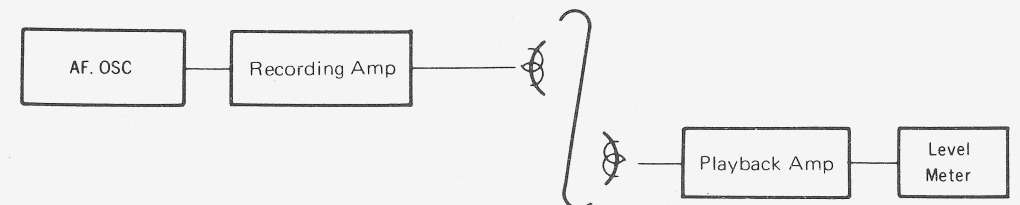
### 6. Recording amplifier equalizer characteristic



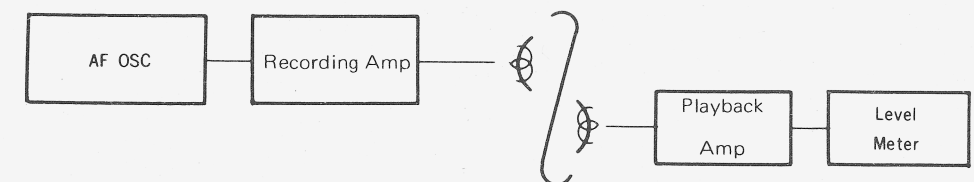
### 7. Record/playback S/N ratio



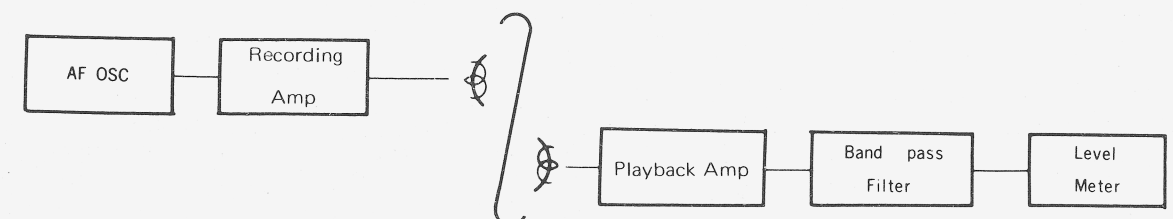
### 8. Record/playback crosstalk



### 9. Record/playback distortion factor



### 10. Erase effect





# TROUBLE SHOOTING

## ■ MECHANISM SECTION

Complaint	Possible Cause	Points to be checked and correction
Motor does not turn round.	<ol style="list-style-type: none"> <li>1. Power switch contact points defective.</li> <li>2. Microswitch (automatic shut-off switch S13) contact points defective.</li> <li>3. Phase advancer capacitor leaking or shorted.</li> <li>4. Motor field coil open.</li> <li>5. Motor shaft seizer.</li> <li>6. Rotor binding in stator due to off-centered rotor shaft.</li> </ol>	<p>Continuity test. Continuity test.</p> <p>Make a continuity test on the capacitor C403/404 or remove the capacitor and install new one. Replace motor. Overhaul and lubricate. Overhaul and lubricate.</p>
Motor turns round but lacks power.	<ol style="list-style-type: none"> <li>1. Phase advancer capacitor leaking or shorted.</li> <li>2. Motor shaft seized.</li> </ol>	<p>Make a continuity test on the capacitor C403/404 or remove the capacitor and install new one. Overhaul and lubricate.</p>
Capstan does not turn round.	<ol style="list-style-type: none"> <li>1. Motor inoperative.</li> <li>2. Motor pulley slipping (screw loosened).</li> <li>3. Idler (1) slipping (contaminated with oil or grease).</li> <li>4. Idler (1) slipping (Rubber hardened).</li> <li>5. Flywheel bearing seized.</li> <li>6. No thrust play.</li> </ol>	<p>Check motor. Tighten with hexagon wrench. Wipe clean with a clean close dampened with alcohol. Replace. Overhaul and lubricate. Adjust.</p>
Capstan turns round but lacks speed causing erratic feeding.	<ol style="list-style-type: none"> <li>1. Idler (1) slipping.</li> <li>2. Motor pulley slipping.</li> <li>3. Capstan shaft seized or binding with foreign matters lodged.</li> <li>4. Idler (1) spring weakened.</li> <li>5. Pinch-roller pressure insufficient.</li> <li>6. Capstan and pinch roller contaminated with oil or grease.</li> <li>7. Supply reel dragged with brake applied.</li> </ol>	<p>Replace if trouble persists when wiped clean with alcohol. Tighten with hexagon wrench. Overhaul.</p> <p>Check spring tension. Check spring tension. Wipe clean with a clean cloth dampened with alcohol. Check function of brake.</p>
Take-up reel table does not rotate when FWD operation.	<ol style="list-style-type: none"> <li>1. Square belt broken.</li> <li>2. Square belt slipping.</li> <li>3. Take-up reel table remains disengaged.</li> <li>4. Take-up reel table brake remains dragged.</li> </ol>	<p>Replace. Wipe clean with a clean close dampened with alcohol. Check disc (felt). Check function of brake.</p>

Complaint	Possible Cause	Points to be checked and correction
F. F. does not take place.	<ol style="list-style-type: none"> <li>1. Idler (2) slipping.</li> <li>2. Idler (2) remains free.</li> <li>3. Round belt between motor pulley and REW roller slipping or defective.</li> </ol>	<p>Wipe clean with alcohol. Adjust spring tension. Wipe clean with a clean cloth dampened with alcohol or replace.</p>
REW does not take place.	<ol style="list-style-type: none"> <li>1. REW roller slipping.</li> <li>2. REW roller in poor contact.</li> <li>3. Round belt between motor pulley and REW roller slipping or defective.</li> </ol>	<p>Wipe clean with alcohol. Adjust spring tension. Wipe clean with a clean cloth dampened with alcohol or replace.</p>
Tape looses when brought to STOP from F. F. or REW.	<ol style="list-style-type: none"> <li>1. Reel table and lining contaminated with oil or grease.</li> <li>2. Brake lining worn.</li> </ol>	<p>Wipe clean with a clean cloth dampened with alcohol. Replace.</p>
Wow and flutter considerable.	<ol style="list-style-type: none"> <li>1. Face of capstan and pinch roller contaminated.</li> <li>2. Capstan shaft seized.</li> <li>3. Capstan shaft slightly bent.</li> <li>4. Uneven wear of capstan shaft bearing.</li> <li>5. Pinch roller pressure insufficient.</li> <li>6. Pinch roller distorted.</li> <li>7. Idler (1) slipping or distorted.</li> <li>8. Disc (felt) worn or distorted.</li> <li>9. Take-up torque excessive.</li> <li>10. Backtension excessive.</li> <li>11. Motor rotates unsmoothly.</li> </ol>	<p>Wipe clean with a clean cloth dampened with alcohol. Overhaul and lubricate. Replace. Replace. Adjust spring tension. Replace pinch roller. Wipe clean with alcohol or replace. Replace disc (felt). Adjust disc. Adjust backtension with spring. Replace.</p>
Tape is not neatly wound on the reel when F. F. or REW operation.	<ol style="list-style-type: none"> <li>1. Backtension too weak.</li> </ol>	<p>Adjust backtension with spring.</p>
Tape comes into contact with reel.	<ol style="list-style-type: none"> <li>1. Reel distorted or out of normal shape.</li> <li>2. Tape guide pin on panel bent.</li> </ol>	<p>Replace reel. Correct.</p>
Tape squeaks around the head when REW-operation.	<ol style="list-style-type: none"> <li>1. Tape is sticky (tape deteriorated in quality).</li> <li>2. Pad hardened.</li> <li>3. Pad contact pressure out of adjustment.</li> </ol>	<p>Discard and use new type.  Replace pad. Check and adjust pad contact pressure.</p>
Tape breaks or elongate at one side when FWD operation.	<ol style="list-style-type: none"> <li>1. Pinch roller out of vertical position.</li> <li>2. Supply reel table brake remains dragged.</li> <li>3. Backtension excessive.</li> <li>4. Take-up torque excessive.</li> </ol>	<p>Bring pinch roller shaft into vertical position. Check brake. Adjust backtension with spring. Check disc (felt).</p>
Counter does not work.	<ol style="list-style-type: none"> <li>1. Drive belt broken or slipping out of position.</li> <li>2. Counter defective.</li> </ol>	<p>Correctly fit belt in position or replace belt. Replace.</p>
Mechanical noise excessive.	<ol style="list-style-type: none"> <li>1. Ratting is caused by distorted idler.</li> <li>2. Continuous humming is caused by excessive motor vibration.</li> <li>3. Rotating parts lacks lubricant.</li> </ol>	<p>Check to see if rotation of idler makes noise intermittently. Motor defective or loose in mount.  Lubricate.</p>
Automatic stop switch remains on or actuating speed to slow.	<ol style="list-style-type: none"> <li>1. Lever pin binding.</li> <li>2. At fulcrum point, lever pin contaminated or deteriorated with silicon grease.</li> </ol>	<p>Correct. Clean or replace.</p>

Complaint	Possible Cause	Points to be checked and correction
Record button does not lock up.	1. Cam on control lever shaft out of normal position. 2. Length of spoke in record lock mechanism incorrectly adjusted. 3. Leaf spring of record push-switch defective.	Adjust.  Adjust.  Adjust or replace push-switch.
Record button remains locked and does not return to off position.	1. Coil spring in record lock mechanism weakened. 2. Record push-switch lock lever defective.	Adjust with coil spring.  Replace push-switch.
Tape comes into contact with playback head when F.F. or REW operation.	1. Position of shifter pin out of adjustment. 2. Playback head set too close to tape.	Adjust. Adjust.

## ■ AMP. SECTION

### ■ Playback system functions properly

Complaint	Possible Cause	Points to be checked and correction
No erasing takes place.	1. Oscillation stops. 1-1 2SC971(G) (Oscillator) defective. 1-2 Oscillator transformer coil circuit, open. 1-3 S1-3, S2-3 in poor contact. 1-4 C 203 (0.0022 $\mu$ F), C204 (0.0068 $\mu$ F) shorted. 1-5 R205 (22k $\Omega$ ), R206 (100 $\Omega$ ) open. 1-6 C205 (100 $\mu$ F) shorted.	Make a continuity test. Make a continuity test. Make a continuity test. Make a continuity test.  Make a continuity test. Make a continuity test.
	2. Oscillation takes place. 2-1 S1-2, S2-2 in poor contact. 2-2 Erase head coil open. 2-3 Erase head shield wire open or shorted. 2-4 Tape does not come into contact with erase head.	Make a continuity test. Make a continuity test. Make a continuity test. Adjust position of pad and shifter.
No recording takes place (source functions properly).	1. No bias current applied. 1-1 Oscillation stops. 1-2 Bias control potentiometer VR201, VR202 (100k $\Omega$ ) defective. 1-3 S1-1, S2-1 in poor contact.	Check oscillator circuit. Replace.  Make a continuity test.
	2. Head section defective. 2-1 Record head coil open or shorted. 2-2 Wiring from record head open or shorted.	Make a continuity test. Make a continuity test.
	3. Recording equalizer amplifier malfunctions. 3-1 Transistor defective. 3-2 Bias trap coil open. 3-3 Coupling capacitor leaking.  3-4 Resistor open.	Q105, Q106 2SC458L (C) check. Make a continuity test on L103 and L104. Check C114 and C115 (10 $\mu$ F), C118 and C119 (4.7 $\mu$ F). Make a continuity test on R123 and R124 (3.3k $\Omega$ ). Make a continuity test on R121 and R122 (1k $\Omega$ ).

Complaint	Possible Cause	Points to be checked and correction
No recording takes place (Trouble persists even when switched to source). SOURCE).	<ol style="list-style-type: none"> <li>1. Transistor defective.</li> <li>2. Resistor open.</li> <li>3. Capacitor leaking.</li> <li>4. REC LEVEL control defective.</li> <li>5. Wiring from REC LEVEL control open or shorted.</li> <li>6. Microphone jack terminal grounded.</li> </ol>	<p>Check Q101, Q102 2SC-458LG (C), Q103, Q104 2SC-458L (C)</p> <p>Make a continuity test on R112 (18k<math>\Omega</math>), R106, R107 (15k<math>\Omega</math>), R104, R105 (470<math>\Omega</math>), R113, R114 (6.8k<math>\Omega</math>), R115, R116 (1k<math>\Omega</math>).</p> <p>Check C101, C102 (10<math>\mu</math>F), C108, C109 (47<math>\mu</math>F), C110, C111 (10<math>\mu</math>F).</p> <p>Make a continuity test.</p> <p>Make a continuity test.</p> <p>Make a continuity test.</p>
Sound level too low and sound distorted (source functions properly) or high frequency excessive.	<ol style="list-style-type: none"> <li>1. Bias control inadequate. <b>(REGULAR position.)</b> <b>(LOW NOISE position)</b></li> <li>2. Recording amplifier out of normal function.</li> <li>3. Tape in poor contact with record head.</li> <li>4. Foreign matters clinging to record head.</li> </ol>	<p>Adjust potentiometer VR201 VR202 (100k<math>\Omega</math>).</p> <p>Adjust potentiometer VR701, VR702 (250k).</p> <p>Make a continuity test on S11-1, S11-2.</p> <p>Check voltage applied to recording amplifier.</p> <p>Pad contact pressure insufficient.</p> <p>Wipe head with a clean cloth dampened with alcohol.</p>
ZZZ..... noise excessive (source functions normally)	<ol style="list-style-type: none"> <li>1. Bias waveform distorted.</li> <li>2. Recording equalizer amplifier makes noise.</li> </ol>	<p>Check with oscilloscope.</p> <p>Check Q105 Q106 2SC458L (C).</p>
Make a scratching noise.	<ol style="list-style-type: none"> <li>1. Noise originates in recording amplifier (caused from resistor).</li> <li>2. Noise originates in recording amplifier (caused from capacitor).</li> <li>3. Record head magnetized.</li> </ol>	<p>Check loading resistance on Q101 ~ Q106. Also check bias and resistor.</p> <p>Replace capacitors C101, C102, C110 C111, C114, C115, C118 and C119.</p> <p>Damagnetize the record head.</p>
Sound remains free from distortion at low level but becomes distorted when recording level meter is set to normal level.	<ol style="list-style-type: none"> <li>1. Level meter out of adjustment.</li> </ol>	<p>Readjust VR101 and VR102 (250k<math>\Omega</math>.)</p>
Crosstalk excessive.	<ol style="list-style-type: none"> <li>1. Record head height out of adjustment (between tracks).</li> <li>2. Capacitor C103 (100<math>\mu</math>F) leaking (between channels)</li> </ol>	<p>Readjust.</p> <p>Replace.</p>
Recording can be made using MIC, but LINE INPUT and DIN inoperative.	<ol style="list-style-type: none"> <li>1. MIC jack switch in poor contact.</li> </ol>	<p>Make a continuity test.</p>

■ Recording takes place properly

Complaint	Possible Cause	Points to be checked and correction
Reproduce does not take place (no sound is produced).	<ol style="list-style-type: none"> <li>1. Playback head circuit open.</li> <li>2. Head wiring disconnected or shorted.</li> <li>3. Muting switch does not work.</li> </ol>	<p>Make a continuity test.</p> <p>Make a continuity test.</p> <p>Make a continuity test on S6-1, S6-2 (front amp.), and S6-3, S6-4 (rear amp.).</p>

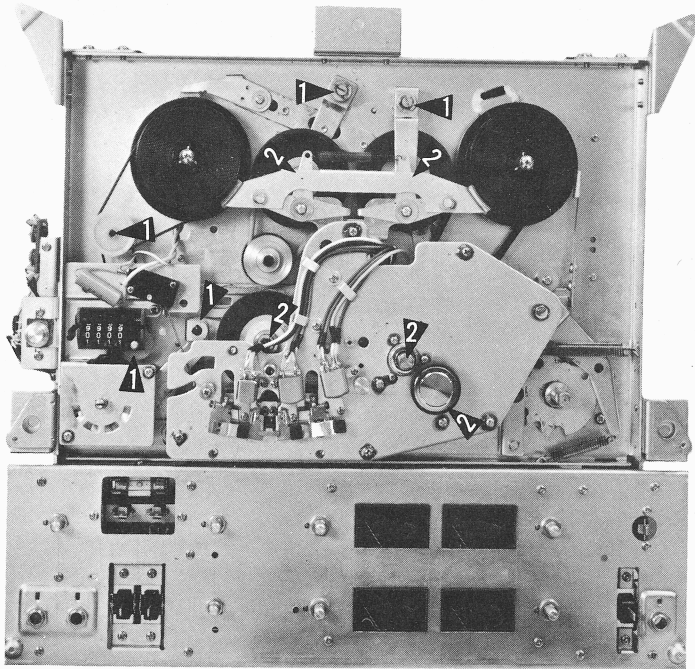
Complaint	Possible Cause	Points to be checked and correction
<p>Reproduce does not take place (no sound is produced).</p> <p>Playback does not take place.</p>	<p>4. Playback equalizer amplifier malfunction.</p> <p>5. Tape not in contact with playback head.</p> <p>6. Potentiometer VR107, VR108 (front amp.), and VR503, VR504 (rear amp.), out of adjustment.</p> <p>7. Output amplifier out of function.</p> <p>8. Shield wire between noise filter → PC board or between PC board → ATT board disconnected or shorted.</p> <p>9. Monitor switch S8, S9, mode switch S7 in poor contact.</p>	<p>Check voltage applied to Q107 ~ Q110 (front amp.), and Q501 ~ Q504 (rear amp.). Check contact pressure of shifter and pad. Readjust.</p> <p>Check voltage on Q111, Q112 (front amp.), and Q507, Q508 (rear amp.). Make a continuity test.</p> <p>Make a continuity test.</p>
Sound level is too low and sound is distorted.	<p>1. Height of playback head out of adjustment.</p> <p>2. Playback amplifier out of normal function.</p>	<p>Readjust position of playback head.</p> <p>Check voltage applied to Q107 ~ Q110 (front amp.), and Q501 ~ Q504.</p>
High-Freq. is not produced (source functions properly)	<p>1. Playback head angle out of adjustment.</p> <p>2. Error of equalization curve.</p>	<p>Readjust.</p> <p>Readjust VR109 and VR110 (front amp.), and VR501, VR502 (rear amp.).</p>
ZZZ..... noise excessive.	<p>1. Noise attribute to transistor (Noise comes out even when tape is play condition).</p> <p>2. Tape defective.</p> <p>3. Equalization curve in high-frequency excessive.</p>	<p>Check Q107 ~ Q110 (front amp.), and Q501 ~ Q504 (rear amp.).</p> <p>Make a test using other tape known to be in good condition.</p> <p>Adjust VR109, VR110 (front amp.), and VR501, VR502 (rear amp.).</p>
Make a scratching noise.	<p>1. Playback head magnetized.</p> <p>2. Noise originating from resistor in playback amplifier.</p> <p>3. Noise originating from capacitor in playback amplifier.</p>	<p>Demagnetize.</p> <p>Check bias resistor and loading resistor of Q107 ~ Q112, Q115, Q116 (front amp.), and Q501 ~ Q508 (rear amp.).</p> <p>Check coupling capacitor.</p>
VU meter out of function (Recording and playback take place normally)	<p>1. Monitor switch S8, S9 in poor contact.</p> <p>2. Transistor in VU Amp. defective.</p> <p>3. VR111, VR112, VR505, VR506 (rear amp.), in poor contact.</p> <p>4. Meter defective.</p>	<p>Make a continuity test.</p> <p>Check Q113, Q114 (front amp.), and Q509, Q510 (rear amp.). (No sound from head phone)</p> <p>Make a continuity test.</p> <p>Replace.</p>
No output from head phone jack (playback takes place normally).	<p>1. Winding of transformer T101, T102 (front amp.), and T501, T502 (rear amp.) open.</p> <p>2. Wiring disconnected.</p> <p>3. Head phone amplifier transistor defective.</p> <p>4. Resistor open.</p> <p>5. Capacitor leaking.</p> <p>6. Head phone switch S10 in poor contact.</p>	<p>Make a continuity test.</p> <p>Make a continuity test.</p> <p>Check Q113, Q114 (front amp.), and Q509, Q510 (rear amp.).</p> <p>Make a continuity test on R158 ~ R163 (front amp.), and R539 ~ R544 (rear amp.).</p> <p>Check C149, C150 (front amp.), and C523, C524 (rear amp.).</p> <p>Make a continuity test.</p>
Power does not turn on.	<p>1. Fuse burnt out.</p> <p>2. Power switch in poor contact.</p>	<p>Make a continuity test.</p> <p>Make a continuity test.</p>

Complaint	Possible Cause	Points to be checked and correction
Power does not turn on.	3. Power transformer circuit open. 4. Rectifying diode Q203, Q204 shorted.	Make a continuity test. Make a continuity test.
Power turns on but neither of recording nor playback takes place.	1. Rectifying diode circuit open. 2. Secondary winding of power transformer disconnected. 3. R207, R208, R209 open. 4. C207, C208, C209 shorted.	Check B-voltage. Check B-voltage. Check B-voltage. Check B-voltage.



# LUBRICATION

\* Number indicates the drops of oil.



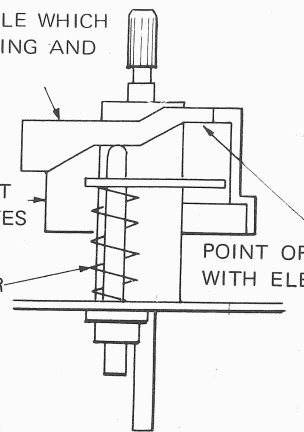
Indicated the point of grease.

INSIDE OF HOLE WHICH  
INSERTES SPRING AND  
STEEL BALL

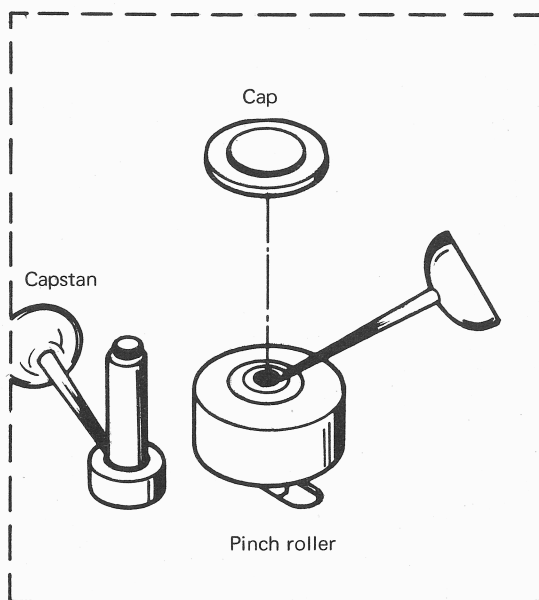
INSIDE OF CUT  
WHICH INSERTES  
LOCK LEVER

ELEVATOR  
SHAFT

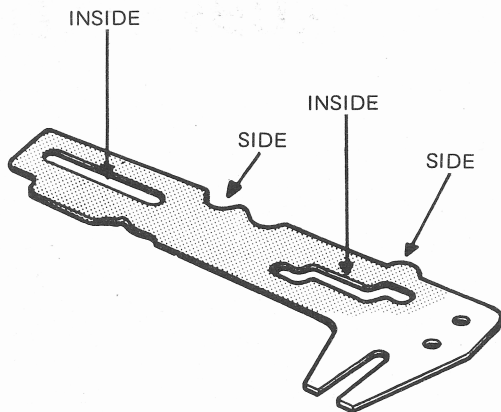
POINT OF CONTACT  
WITH ELEVATOR SHAFT



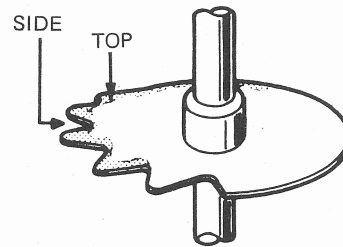
(24-12-16)



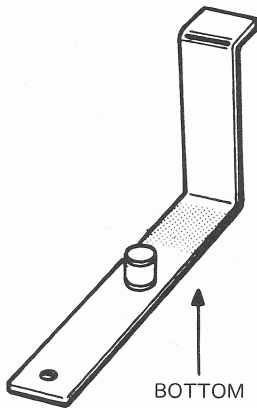
\* Indicated the points of grease and number indicates the parts.



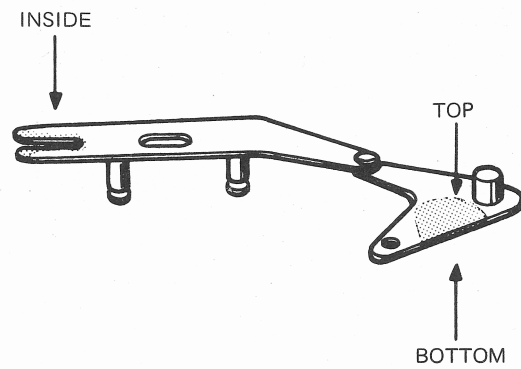
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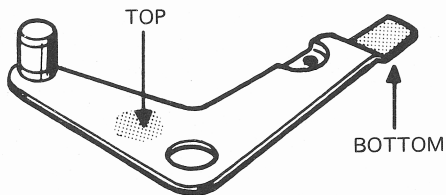
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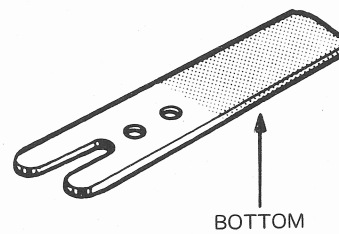
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(24-10-01)



(24-08-02)



(24-06-14)

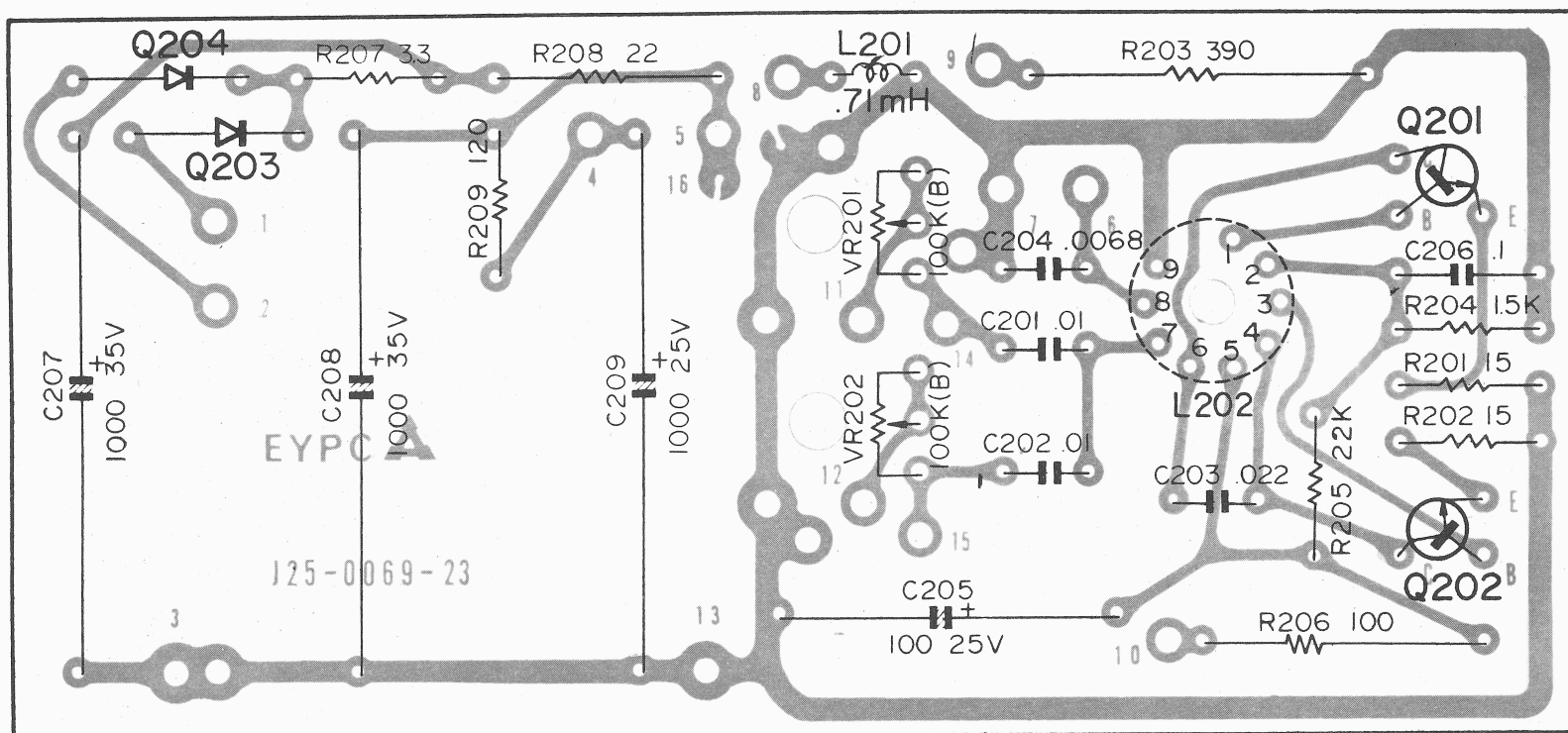
## HOW TO Hz SELECTOR

This deck has been arranged to the source frequency of your district (where it is used). In case of different frequency, you can rearrange the set as follows: Release the stopper of the frequency changeover switch on the side of the set and fix the bolt. Then rearrange the switch and fasten the stopper with another bolt located at the opposite side. Replace the capstan sleeve. These parts should be cleaned with alcohol.

Capstan sleeve diameter:    9 mm for 50 Hz  
   7.4 mm for 60 Hz

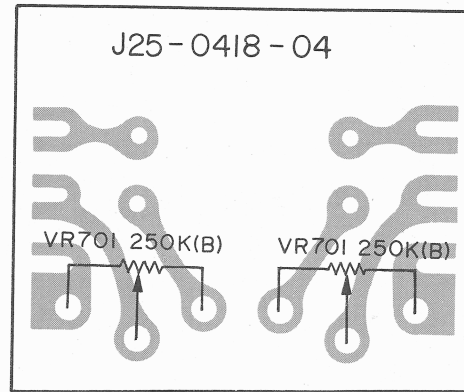
**(Note)** Make sure not to drop the switch and stopper into the tape deck.

▼ POWER SUPPLY & OSC UNIT X00 - 0007 - 02

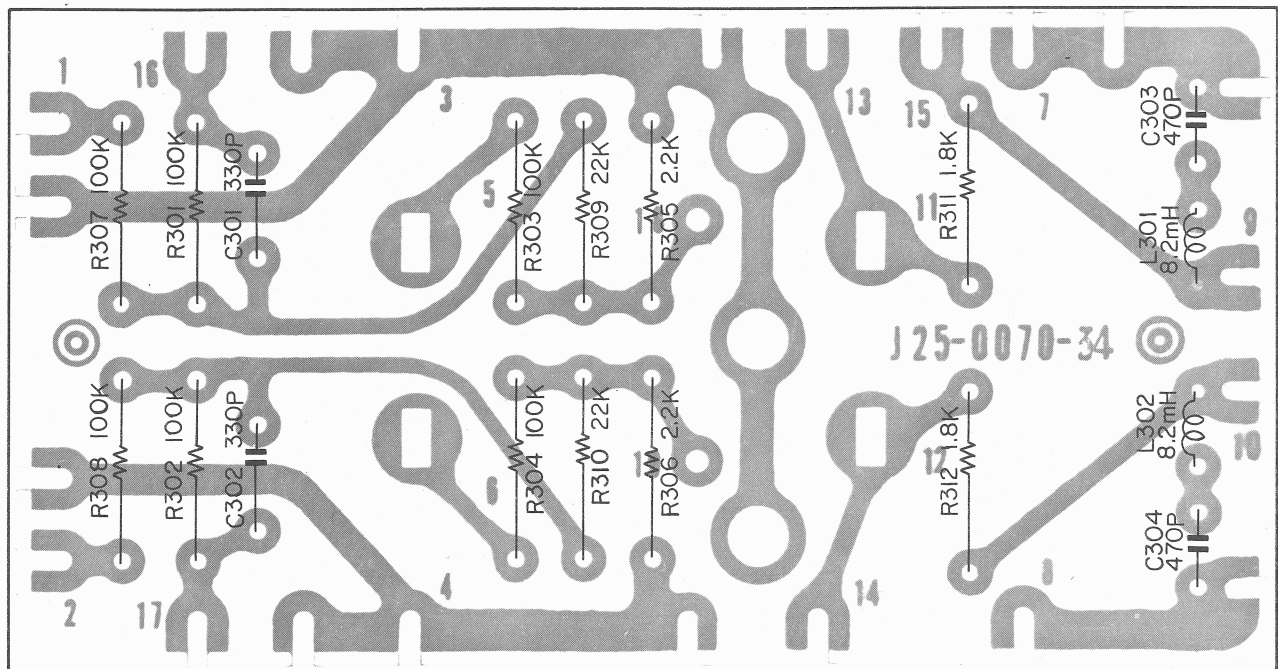


Q201,202 2SC971(G). Q203,204 SM-150-1.

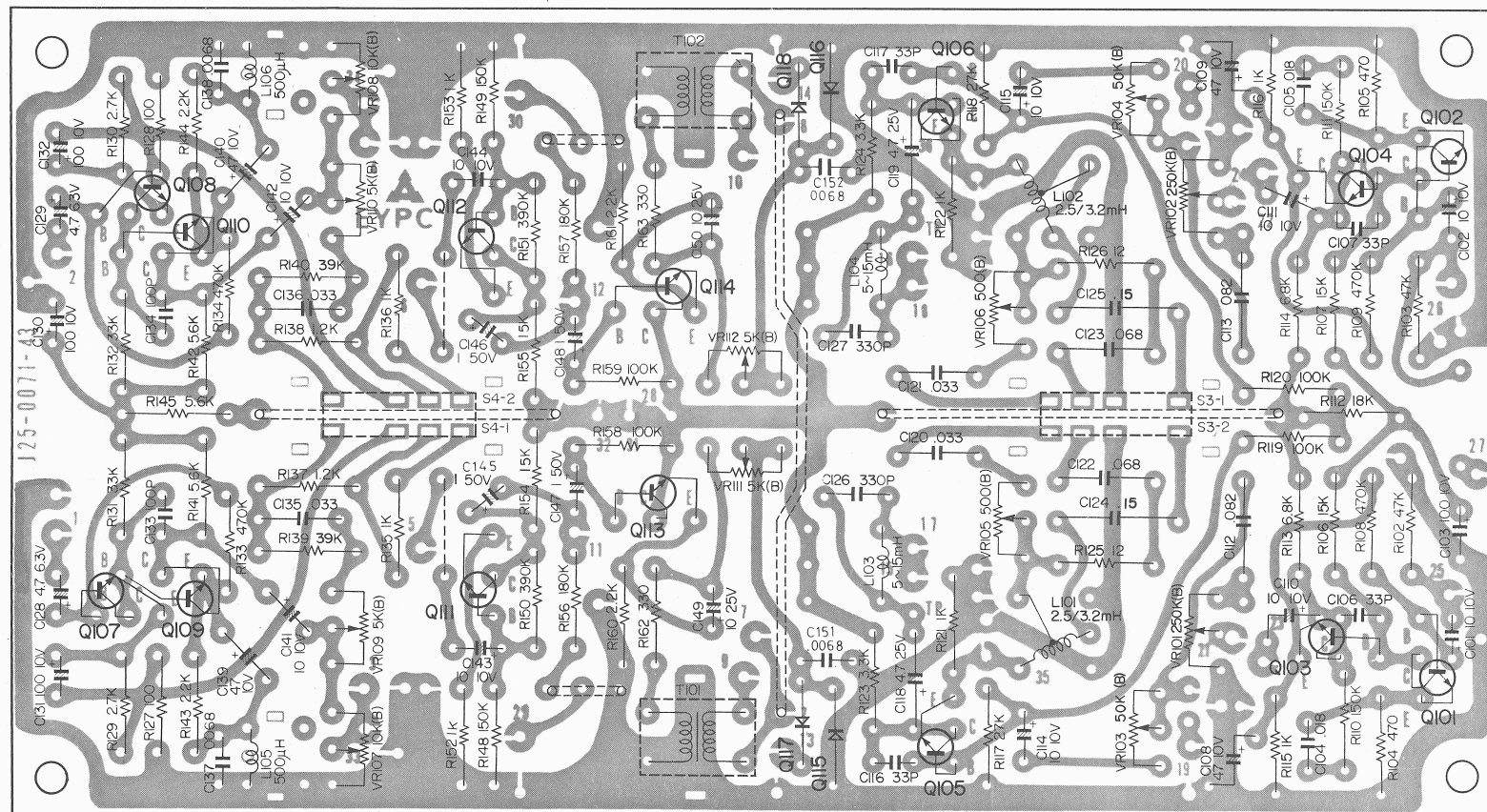
▼ LEVEL ADJUST UNIT X35 - 1510 - 00



▼ ATT UNIT X09 - 0005 - 21



▼ RECORD / PLAYBACK (FRONT AMP.) UNIT X09 - 0006 - 02



Q101,102 ,107,108 2SC458LG(C)or 2SC631-71, Q103~106,109~112 2SC458L(C), Q113,114 2SC733, Q115~118 IN60,





Q501, 502: 2SC458LG(C) or 2SC631-71, Q503~508: 2SC458L(C), Q509, 510: 2SC733, Q511~514: 1N60, Q115, 116: 2SC458L(C)

▼ POWER SUPPLY & OSC UNIT X00 - 0007 - 02

Circuit No.	Parts No.	Description	Remarks
<b>RESISTOR</b>			
R201, 202	PD14BY2E150K	Insulated carbon film 15 $\Omega$ $\pm 10\%$ 1/4W	
R203	RW14AG3G391K	Wire wound 390 $\Omega$ $\pm 10\%$ 4W	
R204	PD14BY2E152K	Insulated carbon film 1.5k $\Omega$ $\pm 10\%$ 1/4W	
R205	PD14BY2E223K	Insulated carbon film 22k $\Omega$ $\pm 10\%$ 1/4W	
R206	RW14AG3D101K	Wire wound 100 $\Omega$ $\pm 10\%$ 2W	
R207	RC05GF2H3R3K	Carbon composition 3.3 $\Omega$ $\pm 10\%$ 1/2W	
R208	RC05GF3A220K	Carbon composition 22 $\Omega$ $\pm 10\%$ 1W	
R209	RC05GF2H121K	Carbon composition 120 $\Omega$ $\pm 10\%$ 1/2W	
<b>CAPACITOR</b>			
C201, 202	CQ93M1H103K	Mylar 0.01 $\mu$ F $\pm 10\%$	
C203	CQ93M1H223K	Mylar 0.022 $\mu$ F $\pm 10\%$	
C204	CQ93M1H682K	Mylar 0.0068 $\mu$ F $\pm 10\%$	
C205	CE02W1E101	PC electrolytic 100 $\mu$ F 25WV	
C206	CQ93M1H104K	Mylar 0.1 $\mu$ F 35WV	
C207~209	CE02W1V102	PC electrolytic 1000 $\mu$ F 35WV	
<b>POTENTIOMETER</b>			
VR201, 202	R12-5016-05	PC trimmer potentiometer 100k $\Omega$ (B)	
<b>SEMICONDUCTOR/COIL</b>			
Q201, 202		2SC971 $\text{\textcircled{G}}$	
Q203, 204		SM150-01	
L201	L33-0107-05	Ferri-inductor 0.71mH	
L202	L19-0006-05	OSC transformer	
<b>MISCELLANEOUS</b>			
—	J25-0069-23	PC board	

▼ LEVEL ADJUST UNIT X35 - 1510 - 00

Circuit No.	Parts No.	Description	Remarks
<b>POTENTIOMETER</b>			
VR701, 702	R12-6002-05	PC trimmer potentiometer 250k $\Omega$ (B)	
<b>MISCELLANEOUS</b>			
—	J25-0418-04	PC board	

▼ ATT UNIT X09 - 0005 - 21

Circuit No.	Parts No.	Description	Remarks
<b>RESISTOR</b>			
R301~304	PD14BY2E104J	Insulated carbon film 100k $\Omega$ $\pm 5\%$ 1/4W	
R305, 306	PD14BY2E222J	Insulated carbon film 2.2k $\Omega$ $\pm 5\%$ 1/4W	
R307, 308	PD14BY2E104J	Insulated carbon film 100k $\Omega$ $\pm 5\%$ 1/4W	
R309, 310	PD14BY2E223J	Insulated carbon film 22k $\Omega$ $\pm 5\%$ 1/4W	
R311, 312	PD14BY2E182J	Insulated carbon film 1.8k $\Omega$ $\pm 5\%$ 1/4W	
<b>CAPACITOR</b>			
C301, 302	CC94SL1H331K	Ceramic 330PF $\pm 10\%$	
C303, 304	CK94YX1H471K	Ceramic 470PF $\pm 10\%$	

Circuit No.	Parts No.	Description	Remarks
<b>COIL</b>			
L301, 302	L33-0114-05	Ferri-inductor 8.2mH	
<b>MISCELLANEOUS</b>			
—	J25-0070-34	PC board	

▼ RECORD/PLAYBACK UNIT (FRONT AMP.) Y09 - 0006 - 02

Circuit No.	Parts No.	Description	Remarks
<b>RESISTOR</b>			
R102, 103	PD14BY2E473J	Insulated carbon film 47k $\Omega$ $\pm 5\%$ 1/4W	
R104, 105	PD14BY2E471J	Insulated carbon film 470 $\Omega$ $\pm 5\%$ 1/4W	
R106, 107	PD14BY2E153J	Insulated carbon film 15k $\Omega$ $\pm 5\%$ 1/4W	
R108, 109	PD14BY2E474J	Insulated carbon film 470k $\Omega$ $\pm 5\%$ 1/4W	
R110, 111	PD14BY2E154J	Insulated carbon film 150k $\Omega$ $\pm 5\%$ 1/4W	
R112	PD14BY2E183J	Insulated carbon film 18k $\Omega$ $\pm 5\%$ 1/4W	
R113, 114	PD14BY2E682J	Insulated carbon film 6.8k $\Omega$ $\pm 5\%$ 1/4W	
R115, 116	PD14BY2E102J	Insulated carbon film 1k $\Omega$ $\pm 5\%$ 1/4W	
R117, 118	PD14BY2E273J	Insulated carbon film 27k $\Omega$ $\pm 5\%$ 1/4W	
R119, 120	PD14BY2E104J	Insulated carbon film 100k $\Omega$ $\pm 5\%$ 1/4W	
R121, 122	PD14BY2E102J	Insulated carbon film 1k $\Omega$ $\pm 5\%$ 1/4W	
R123, 124	PD14BY2E332J	Insulated carbon film 3.3k $\Omega$ $\pm 5\%$ 1/4W	
R125, 126	PD14BY2E120J	Insulated carbon film 12 $\Omega$ $\pm 5\%$ 1/4W	
R127, 128	PD14BY2E101J	Insulated carbon film 100 $\Omega$ $\pm 5\%$ 1/4W	
R129, 130	PD14BY2E272J	Insulated carbon film 2.7k $\Omega$ $\pm 5\%$ 1/4W	
R131, 132	PD14BY2E333J	Insulated carbon film 33k $\Omega$ $\pm 5\%$ 1/4W	
R133, 134	PD14BY2E474J	Insulated carbon film 470k $\Omega$ $\pm 5\%$ 1/4W	
R135, 136	PD14BY2E102J	Insulated carbon film 1k $\Omega$ $\pm 5\%$ 1/4W	
R137, 138	PD14BY2E122J	Insulated carbon film 1.2k $\Omega$ $\pm 5\%$ 1/4W	
R139, 140	PD14BY2E393J	Insulated carbon film 39k $\Omega$ $\pm 5\%$ 1/4W	
R141, 142	PD14BY2E562J	Insulated carbon film 5.6k $\Omega$ $\pm 5\%$ 1/4W	
R143, 144	PD14BY2E222J	Insulated carbon film 2.2k $\Omega$ $\pm 5\%$ 1/4W	
R145	PD14BY2E562J	Insulated carbon film 5.6k $\Omega$ $\pm 5\%$ 1/4W	
R148, 149	PD14BY2E154J	Insulated carbon film 150k $\Omega$ $\pm 5\%$ 1/4W	
R150, 151	PD14BY2E394J	Insulated carbon film 390k $\Omega$ $\pm 5\%$ 1/4W	
R152, 153	PD14BY2E121J	Insulated carbon film 120 $\Omega$ $\pm 5\%$ 1/4W	
R154, 155	PD14BY2E153J	Insulated carbon film 15k $\Omega$ $\pm 5\%$ 1/4W	
R156, 157	PD14BY2E184J	Insulated carbon film 180k $\Omega$ $\pm 5\%$ 1/4W	
R158, 159	PD14BY2E104J	Insulated carbon film 100k $\Omega$ $\pm 5\%$ 1/4W	
R160, 161	PD14BY2E222J	Insulated carbon film 2.2k $\Omega$ $\pm 5\%$ 1/4W	
R162, 163	PD14BY2E331J	Insulated carbon film 330 $\Omega$ $\pm 5\%$ 1/4W	
R168, 169	PD14BY2E102J	Insulated carbon film 1k $\Omega$ $\pm 5\%$ 1/4W	
<b>CAPACITOR</b>			
C101, 102	CE04W1A100	PC electrolytic 10 $\mu$ F 10WV	
C103	CE04W1A101	PC electrolytic 100 $\mu$ F 10WV	
C104, 105	CQ93M1H183K	Mylar 0.018 $\mu$ F $\pm 10\%$	
C106, 107	CC94SL1H330K	Ceramic 33PF $\pm 10\%$	
C108, 109	CE04W1A470	PC electrolytic 47 $\mu$ F 10WV	
C110, 111	CE04W1A100	PC electrolytic 10 $\mu$ F 10WV	
C112, 113	CQ93M1H183K	Mylar 0.018 $\mu$ F $\pm 10\%$	
C114, 115	CE04W1A100	PC electrolytic 10 $\mu$ F 10WV	
C116, 117	CC94SL1H330K	Ceramic 33PF $\pm 10\%$	
C118, 119	CSO4EJ4R7	Tantalum 4.7 $\mu$ F 25WV	
C120, 121	CQ93M1H333K	Mylar 0.033 $\mu$ F $\pm 10\%$	

Circuit No.	Parts No.	Description	Remarks
C122, 123	CQ93M1H683K	Mylar 0.068 $\mu$ F $\pm$ 10%	
C124, 125	CQ93M1H154K	Mylar 0.15 $\mu$ F $\pm$ 10%	
C126, 127	CC94SL1H331K	Ceramic 330 $\mu$ F $\pm$ 10%	
C128, 129	CSO4EJ4R7	Tantalum 4.7 $\mu$ F 6.3WV	
C130~132	CE04W1A101	PC electrolytic 100 $\mu$ F 10WV	
C133, 134	CC94SL1A101K	Mylar 100PF $\pm$ 10%	
C135, 136	CQ93M1H393K	Mylar 0.039 $\mu$ F $\pm$ 10%	
C137, 138	CQ93M1H682K	Mylar 0.0068 $\mu$ F $\pm$ 10%	
C139, 140	CE04W1A470	PC electrolytic 47 $\mu$ F 10WV	
C141~144	CE04W1A100	PC electrolytic 10 $\mu$ F 10WV	
C145~148	CE04W1H1R0	PC electrolytic 1 $\mu$ F 50WV	
C149, 150	CE04W1E100	PC electrolytic 10 $\mu$ F 25WV	
C151, 152	CQ93M1H682K	Mylar 0.0068 $\mu$ F $\pm$ 10%	
<b>POTENTIOMETER</b>			
VR101, 102	R12-6004-05	PC trimmer potentiometer 250k $\Omega$ (B)	
VR103, 104	R12-4015-05	PC trimmer potentiometer 50k $\Omega$ (B)	
VR105, 106	R12-0039-05	PC trimmer potentiometer 500 $\Omega$ (B)	
VR 107, 108	R12-3022-05	PC trimmer potentiometer 10k $\Omega$ (B)	
VR109~112	R12-2014-05	PC trimmer potentiometer 5k $\Omega$ (B)	
<b>SEMICONDUCTOR</b>			
Q101, 102		2SC458LG $\odot$ or 2SC631-71	
Q103~106		2SC458L $\odot$	
Q107, 108		2SC458LG $\odot$ or 2SC631-71	
Q109~112		2SC458L $\odot$	
Q113, 114		2SC733	
Q115~118		1N60	
<b>COIL/TRANSFORMER</b>			
L101, 102	L31-0051-05	Rec equalizer coil 2.5/3.2mH	
L103, 104	L31-0125-05	Bias trap coil 5~15mH	
L105, 106	L31-0049-05	Bias trap coil 500 $\mu$ H	
T101, 102	L10-0003-05	Output transformer	
<b>MISCELLANEOUS</b>			
—	J25-0071-43	PC board	
S3	S32-2003-35	Record equalizer SW	
S4	S32-2003-35	Playback equalizer SW	

COLOR CODE

▼ PLAYBACK (REAR AMP.) UNIT X28 - 1000 - 00

Circuit No.	Parts No.	Description					Remarks
R501, 502	PD14BY2E333J	Insulated carbon film	33kΩ	±5%	1/4W		
R503, 504	PD14BY2E272J	Insulated carbon film	2.7kΩ	±5%	1/4W		
R505, 506	PD14BY2E101J	Insulated carbon film	100Ω	±5%	1/4W		
R507, 508	PD14BY2E474J	Insulated carbon film	470kΩ	±5%	1/4W		
R509, 510	PD14BY2E102J	Insulated carbon film	1kΩ	±5%	1/4W		
R511, 512	PD14BY2E122J	Insulated carbon film	1.2kΩ	±5%	1/4W		
R513, 514	PD14BY2E393J	Insulated carbon film	39kΩ	±5%	1/4W		
R515, 516	PD14BY2E562J	Insulated carbon film	5.6kΩ	±5%	1/4W		
R517, 518	PD14BY2E222J	Insulated carbon film	2.2kΩ	±5%	1/4W		
R519, 520	PD14BY2E102J	Insulated carbon film	1kΩ	±5%	1/4W		
R521, 522	PD14BY2E823J	Insulated carbon film	82kΩ	±5%	1/4W		
R523, 524	PD14BY2E274J	Insulated carbon film	270kΩ	±5%	1/4W		
R525, 526	PD14BY2E123J	Insulated carbon film	12kΩ	±5%	1/4W		
R527, 528	PD14BY2E391J	Insulated carbon film	390Ω	±5%	1/4W		
R529, 530	PD14BY2E154J	Insulated carbon film	150kΩ	±5%	1/4W		
R531, 532	PD14BY2E394J	Insulated carbon film	390kΩ	±5%	1/4W		
R533, 534	PD14BY2E682J	Insulated carbon film	6.8kΩ	±5%	1/4W		
R535, 536	PD14BY2E102J	Insulated carbon film	1kΩ	±5%	1/4W		
R537, 538	PD14BY2E184J	Insulated carbon film	180kΩ	±5%	1/4W		
R539, 540	PD14BY2E104J	Insulated carbon film	100kΩ	±5%	1/4W		
R541, 542	PD14BY2E222J	Insulated carbon film	2.2kΩ	±5%	1/4W		
R543, 544	PD14BY2E331J	Insulated carbon film	330Ω	±5%	1/4W		
R545,	PD14BY2E562J	Insulated carbon film	5.6kΩ	±5%	1/4W		
R170, 171	PD14BY2E102J	Insulated carbon film	1kΩ	±5%	1/4W		
R172, 173	PD14BY2E274J	Insulated carbon film	270kΩ	±5%	1/4W		
R174, 175	PD14BY2E823J	Insulated carbon film	82kΩ	±5%	1/4W		
R176, 177	PD14BY2E123J	Insulated carbon film	12kΩ	±5%	1/4W		
R178, 179	PD14BY2E391J	Insulated carbon film	390Ω	±5%	1/4W		

CAPACITOR

C501, 502	CS04E0J4R7	Tantalum	4.7μF	6.3WV	
C503, 504	CE04W1A101	PC electrolytic	100μF	10WV	
C505, 506	CC94SL1H101K	Ceramic	100PF	±10%	
C507, 508	CQ93M1H333K	Mylar	0.033μF	±10%	
C509, 510	CE04W1A470	PC electrolytic	47μF	10WV	
C511, 512	CQ93M1H682K	Mylar	0.0068μF	±10%	
C513~518	CE04W1A100	PC electrolytic	10μF	10WV	
C519~522	CE04W1H010	PC electrolytic	1μF	50WV	
C523, 524	CE04W1E100	PC electrolytic	10μF	25WV	
C525, 526	CQ93M1H682K	Mylar	0.0068μF	±10%	
C527	CE04W1A101	PC electrolytic	100μF	10WV	
C151, 152	CE04W1A100	PC electrolytic	10μF	10WV	

POTENTIOMETER

VR501, 502	R12-2014-05	PC trimmer potentiometer	5kΩ (B)	
VR503, 504	R12-3022-05	PC trimmer potentiometer	10kΩ (B)	
VR505, 506	R12-2014-05	PC trimmer potentiometer	5kΩ (B)	

SEMICONDUCTOR

Q501, 502		2SC458LG© or 2SC631-71	
Q503~508		2SC458L ©	
Q509, 510		2SC733	
Q511~514		1N60	
Q115, 116		2SC458L©	

COIL/TRANSFORMER

L501, 502	L31-0049-05	Bias trap coil	500μH	
T501, 502	L10-0003-05	Output transformer		

MISCELLANEOUS

— S5	J25-0531-02 S32-2003-35	PC board Playback equalizer SW	
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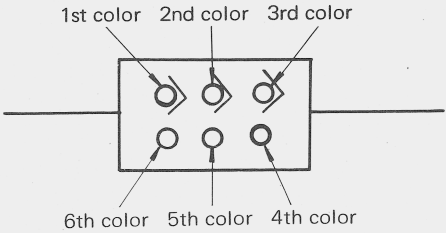
RESISTOR

COLOR (meaning)	1st (value)	2nd (value)	3rd (multiplier)	4th (tolerance)
Black	0	0	10 <sup>0</sup>	—
Brown	1	1	10 <sup>1</sup>	± 1%
Red	2	2	10 <sup>2</sup>	± 2%
Orange	3	3	10 <sup>3</sup>	—
Yellow	4	4	10 <sup>4</sup>	—
Green	5	5	10 <sup>5</sup>	—
Blue	6	6	10 <sup>6</sup>	—
Purple	7	7	10 <sup>7</sup>	—
Grey	8	8	10 <sup>8</sup>	—
White	9	9	10 <sup>9</sup>	—
Gold	—	—	10 <sup>-1</sup>	± 5%
Silver	—	—	10 <sup>-2</sup>	±10%
Non-color	—	—	—	±20%

1st color 2nd color 3rd color 4th color

CAPACITOR (MICA)

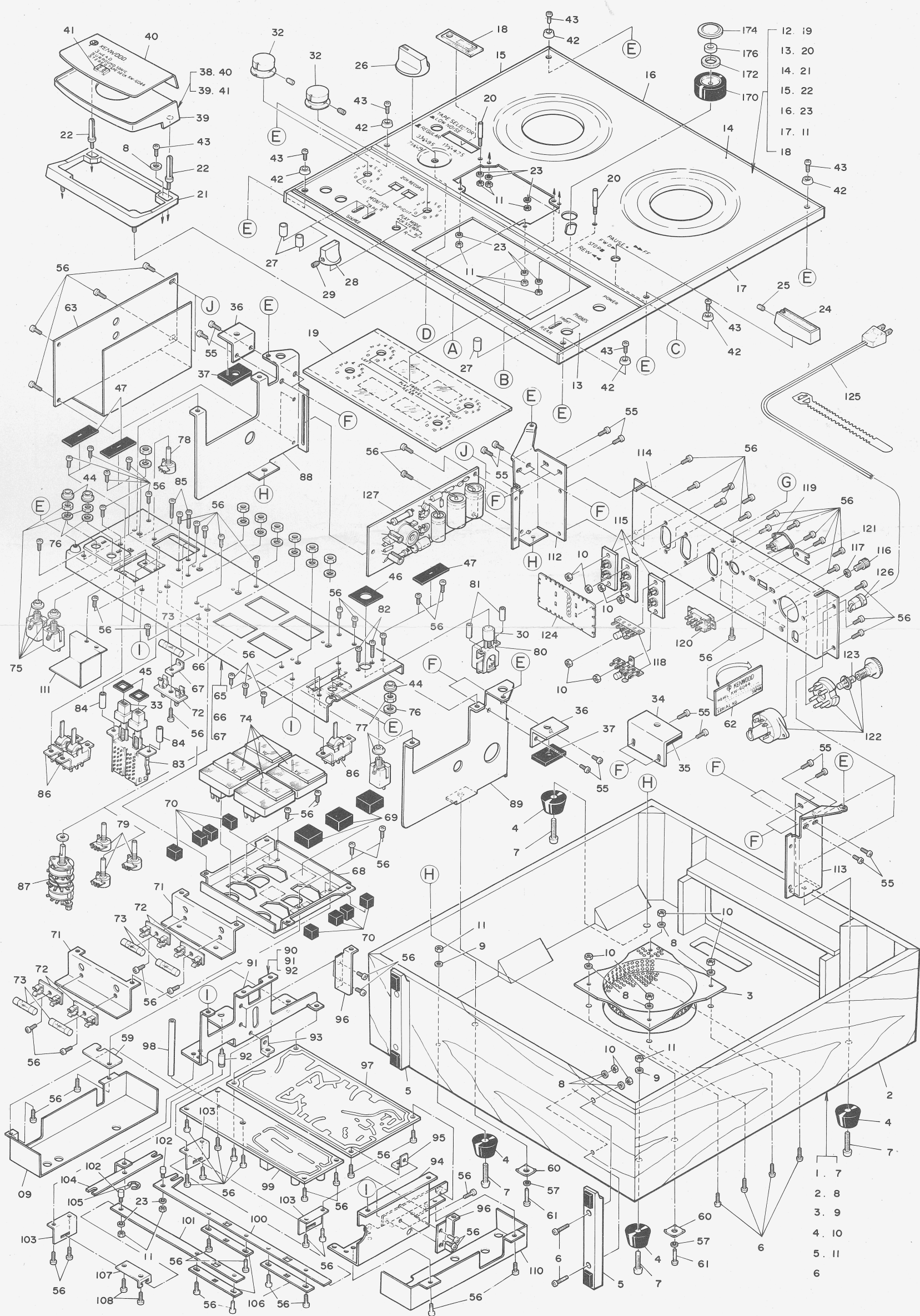
COLOR (meaning)	1st (grade)	2nd (value)	3rd (value)	4th (multiplier)	5th (tolerance)	6th (characteristic)
Black	X	0	0	10 <sup>0</sup>	±20%	—
Brown	—	1	1	10 <sup>1</sup>	± 1%	B
Red	Z	2	2	10 <sup>2</sup>	± 2%	C
Orange	—	3	3	10 <sup>3</sup>	—	D
Yellow	—	4	4	10 <sup>4</sup>	—	E
Green	—	5	5	—	*± 5%	—
Blue	—	6	6	—	—	—
Purple	—	7	7	—	—	—
Grey	Y	8	8	—	—	—
White	—	9	9	0.1	±10%	—



Unit = pF

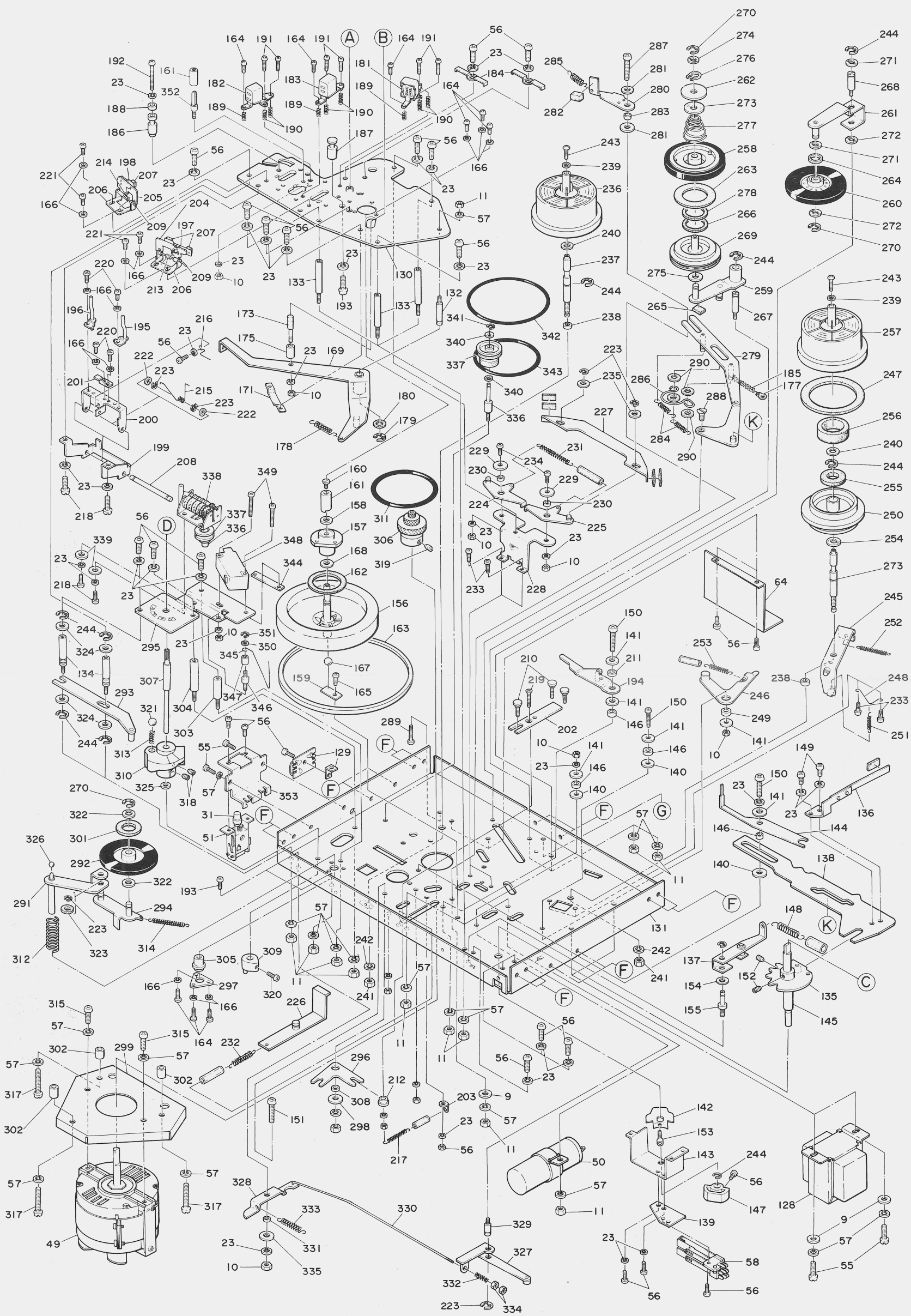
\* Capacitance being less than 10pF is ±0.5pF on tolerance.





# EXPLODED VIEW





PARTS LIST OF EXPLODED VIEW

\* In America add to the parts of (K), in other area do to the parts of (U):

Ref. No	Parts No.	Description	Remarks
1	A03-0081-01	Case assembly	
2	A03-0080-01	Case	
3	B04-0011-03	Safety cover	
4	J03-0012-04	Legs x 4	
5	J09-0043-04	Standing legs assembly x 2	
6	N30-3012-11	Pan head screw x 8	
7	N30-4020-11	Pan head screw x 4	
8	N15-1030-11	Flat washer x 8	
9	N15-1040-11	Flat washer x 2	
10	N10-2030-11	Nut x 16	
11	N10-2040-11	Nut x 2	
12	A70-0049-01	Panel assembly	
13	A20-0393-02	Panel A	
14	A20-0394-01	Panel B	
15	B01-0016-03	Frame A	
16	B61-0010-03	Frame B	
17	B01-0017-03	Frame C	
18	B07-0045-14	Counter window	
19	F07-0197-03	Meter cover	
20	J90-0028-04	Tape guide x 2	
21	F08-0009-12	Housing base	
22	D29-0008-09	Tip x 2	
23	N16-0030-41	Spring washer x 10	
24	K21-0115-05	Control lever	
25	N09-0018-14	Set screw	
26	K23-0031-04	Speed changeover knob	
27	K29-0026-14	Knob x 3	
28	K20-0002-14	Knob	
29	N73-4008-11	Set screw	
30	K29-0004-04	Push button A assembly	
31	K29-0025-34	Push button C	
32	K20-0027-24	Level knob x 6	
33	K29-0012-04	Record button x 2	
34	J21-0498-04	Mounting stopper E	
35	G16-0015-04	Sheet A	
36	J21-0807-04	Mounting stopper x 2	
37	G16-0037-04	Sheet x 2	
38	F08-0033-03	Housing assembly	
39	F08-0008-22	Housing	
40	B03-0034-03	Housing plate	
41	B43-0146-04	Badge	
42	J19-0092-04	Spacer x 6	
43	N35-3006-13	Binding screw x 7	
44	J41-0005-04	Phone bushing x 3	
45	F15-0045-04	Shutter x 2	
46	G16-0036-04	Sheet F	
47	G16-0035-04	Sheet x 3	
48	D40-0100-05	* Mechanism assembly	(K)
	D40-0101-05	* Mechanism assembly	(U)
49	T40-0008-05	Motor	
50	C90-0103-05	Phase advancer capacitor 1.7μF + 0.3μF	

Ref. No.	Parts No.	Description	Remarks
51	S40-4007-05	Tape selector	
52	N30-3006-11	Pan head screw	
53	CP02B2J473M	Oil filled capacitor 0.047μF 630WV	
54	212-1502-05	Vinyl tube	
55	N30-4006-11	Pan head screw	
56	N30-3006-11	Pan head screw x 81	
57	N16-0040-41	Spring washer x 14	
58	S46-4001-05	Muting switch (S6)	
59	D19-0026-04	Connecting plate	
60	N19-0002-04	Square washer x 2	
61	N30-4012-11	Pan head screw x 2	
62	B40-0489-04	Distination plate	
63	F11-0137-03	Shielding case A	
64	F11-0138-14	Shielding case B	
65	A70-0050-12	Chassis assembly	
66	A10-0251-12	Chassis	
67	J21-0772-04	Lamp holder	
68	J20-0175-04	Meter bracket	
69	G11-0017-04	Cushion A x 3	
70	G11-0018-04	Cushion B x 8	
71	J20-0176-04	Lamp stopper x 2	
72	J13-0023-05	Fuse holder x 5	
73	B30-0015-15	Pilot lamp x 5	
74	B31-0112-05	VU meter x 4	
75	E11-0040-05	MIC jack x 2	
76	N19-0138-04	Nylon washer x 2	
77	E11-0041-05	Head phone jack	
78	R01-3009-05	Level volume 10kΩ (A) x 2	
79	R01-4002-05	Level volume 50kΩ (A) x 4	
80	S39-1001-05	Push switch (POWER)	
81	J31-0067-04	Collar A x 2	
82	N30-3020-11	Pan head screw x 2	
83	S40-2017-15	Record switch	
84	J31-0068-04	Collar B x 2	
85	N30-3025-11	Pan head screw x 2	
86	S36-2018-05	Lever switch (S10) x 3	
87	S04-3011-05	Rotary switch	
88	J21-0779-02	Holder A	
89	J21-0780-02	Holder B	
90	J21-0813-03	PC board holder assembly	
91	J21-0775-03	PC board holder	
92	D21-0179-04	Lever shaft	
93	J21-0499-04	PC board holder A	
94	J21-0776-03	PC board holder D	
95	J21-0500-04	PC board holder B	
96	F30-0016-04	Reinforcing plate	
97	X09-0006-02	Record / playback PC board	
98	D17-0021-04	Rod	
99	X28-1000-00	Playback PC board	
100	D10-0069-03	Equalizer changeover lever A	

Ref. No.	Parts No.	Description	Remarks
101	D10-0070-04	Equalizer changeover lever C	
102	J32-0125-04	Knock pin x 2	
103	F30-0015-04	Lever holder	
104	D10-0071-04	Equalizer changeover lever B	
105	N24-3040-60	E washer	
106	J29-0029-04	Adjusting plate	
107	J90-0039-04	Guide	
108	N30-2604-11	Pan head screw x 2	
109	F01-0215-04	Shield plate B	
110	F10-0216-14	Shield plate C	
111	F10-0227-14	Shield plate D	
112	J21-0111-13	Holder C	
113	J21-0112-13	Holder D	
114	A23-0214-12	Rear panel	
115	E13-0204-05	2P pin jack	
116	N08-0002-04	Gnd. terminal	
117	N17-1040-41	Inter rock washer	
118	E22-0405-05	Lug type terminal strips	
119	E06-0501-05	DIN connector	
120	S31-2001-05	Hz selector (S12) UL	
121	D32-0021-04	Switch stopper	
122	E29-0018-05	Voltage selector with fuse holder	
123	F05-1023-05	Fuse	
124	X09-0005-21	ATT PC board	
125	E30-0046-05	Power cord UL CSA	
126	J41-0006-00	Cord bushing	
127	X00-0007-02	Power supply and OSC PC board	
128	L09-0094-05	Power transformer	
129	X35-1510-00	Level adjust PC board	
130	25-01-01	Head panel	
131	25-01-11	Chassis	
132	25-01-41	Shaft	
133	23-01-41	Shaft x 3	
134	24-12-43	Shaft	
135	25-02-01	Cam	
136	25-02-02	Holder	
137	25-02-03	Arm	
138	25-02-15	Slide	
139	24-02-12	Holder	
140	24-02-16	Washer x 3	
141	24-02-17	Washer x 4	
142	24-02-19	Record lock cam	
143	25-02-17	Holder	
144	25-02-16	Lever	
145	23-02-41	Shaft	
146	24-02-51	Ring x 3	
147	24-02-62	Cam	
148	S70J40	Coil spring	
149	N30-3004-11	Small pan head screw (3φ x 4) x 2	
150	N30-3012-11	Small pan head screw (3φ x 12) x 2	

Ref. No.	Parts No.	Description	Remarks
151	N30-3015-11	Small pan head screw (3 $\phi$ x 15)	
152	N77-4006-11	Set screw with hexagon hole (4 $\phi$ x 6) x 2	
153		Bolt with hexagon (3 $\phi$ x 6)	
154		Fiber washer (5 $\phi$ x 10 $\phi$ x 0.5 <sup>t</sup> )	
155	23-02-44	Stopper shaft	
156	24-03-01	Fly wheel	
157	25-03-01	Housing	
158	25-03-21	Cap	
159	21-03-22	Ball bearing	
160	25-03-41	Set screw	
161	24-03-52	Capstan sleeve 7.4 $\phi$ (60Hz)	
	24-03-53	Capstan sleeve 9 $\phi$ (50Hz)	
162	21-03-32	Oil seal washer	
163	23-03-71	Square belt	
164	N30-2608-11	Small pan head screw (2.6 $\phi$ x 8) x 3	
165	N46-3005-11	Tapping screw (3 $\phi$ x 5)	
166	N16-0026-41	Spring washer (2.6 $\phi$ ) x 3	
167		Steel ball (3.97 $\phi$ )	
168		Nylon washer (6.2 $\phi$ x 10 $\phi$ x 0.3 <sup>t</sup> )	
169	25-04-01	Lever (2)	
170	21-04-01	Pinch roller	
171	25-04-12	Holder	
172	21-04-31	Ring	
173	21-04-41	Shaft	
174	25-04-52	Set screw	
175	21-04-53	Pipe	
176	21-04-54	Ring	
177		Hook	
178	25-04-81	Spring (2)	
179	E24-3050-60	Stop ring (5 $\phi$ )	
180		Fiber washer (6 $\phi$ x 12 $\phi$ x 0.5 <sup>t</sup> )	
181	25-45-01	Playback head	
182	25-05-02	Erase head	
183	25-45-03	Record head	
184	25-05-14	Head holder x 2	
185	25-45-15	Spring	
186	25-05-51	Guide	
187	25-05-52	Guide	
188	25-05-53	Ring	
189	25-05-81	Coil spring x 3	
190	25-05-82	Coil spring x 6	
191	N30-2612-11	Small pan head screw (2.6 $\phi$ x 12) x 6	
192	N30-3030-16	Small pan head screw (3 $\phi$ x 30)	
193	N30-3008-16	Small pan head screw (3 $\phi$ x 8)	
194	25-06-01	Lever	
195	25-06-02	Shifter	
196	25-06-03	Shifter	
197	25-46-04	Pad plate	
198	25-06-05	Pad plate	
199	25-06-11	Holder	
200	25-06-12	Lever	

Ref. No.	Parts No.	Description	Remarks
201	25-06-13	Lever	
202	25-06-17	Slide	
203	24-06-13	Lug	
204	25-06-23	Hinge	
205	25-06-24	Hinge	
206	25-06-25	Hinge	
207	21-06-31	Pad x 3	
208	25-06-41	Shaft	
209	25-06-42	Pin x 2	
210	23-06-41	Shaft x 3	
211	49-12-51	Ring	
212	21-10-52	Collar	
213	25-06-81	Coil spring	
214	25-06-82	Coil spring	
215	25-06-83	Spring	
216	25-06-84	Spring	
217	S50G28	Coil spring	
218	N30-3005-11	Small pan head screw (3 $\phi$ x 5) x 2	
219	N32-3020-11	Flat head screw (3 $\phi$ x 20)	
220	N30-2606-11	Small pan head screw (2.6 $\phi$ x 6) x 2	
221	N30-2604-11	Small pan head screw (2.6 $\phi$ x 4) x 4	
222		Nylon washer (4.2 $\phi$ x 8 $\phi$ x 0.5 <sup>t</sup> )	
223	N24-3032-11	E ring (3.2 $\phi$ ) x 2	
224	25-11-01	Brake lever (left)	
225	25-11-02	Brake lever (right)	
226	24-11-01	Slide	
227	25-11-03	Brake	
228	24-11-14	Holder	
229	24-02-17	Washer	
230	42-11-52	Ring	
231	S45G45	Spring (4)	
232	S40G45	Coil spring	
233	N46-3008-11	Tapping screw (3 $\phi$ x 8) x 2	
234	N30-3008-11	Small pan head screw (3 $\phi$ x 8) x 2	
235		Nylon washer (5.1 $\phi$ x 10 $\phi$ x 0.3 <sup>t</sup> ) x 2	
236	24-07-02	Supply reel table	
237	24-07-42	Shaft	
238	24-07-43	Washer	
239		Polyslider washer (5.1 $\phi$ x 7 $\phi$ x 0.5 <sup>t</sup> )	
240		Polyslider washer (6 $\phi$ x 12 $\phi$ x 0.3 <sup>t</sup> )	
241	N10-2050-11	Nut (5 $\phi$ )	
242	N16-0050-41	Spring washer (5 $\phi$ )	
243	N34-3060-11	Truss screw (3 $\phi$ x 6)	
244	N24-3050-41	E washer (5 $\phi$ )	
245	24-08-01	Lever (9)	
246	24-08-02	Lever (10)	
247	21-08-31	Disc	
248	24-08-41	Spring	
249	24-08-51	Ring	
250	21-08-62	Pulley	

Ref. No.	Parts No.	Description	Remarks
251	S45G45	Coil spring	
252	S65H18	Coil spring	
253	S70H25	Coil spring	
254		Polyslider washer (6.2φ x 14φ x 0.5 <sup>t</sup> )	
255	52-16-32	Disc (felt 2 <sup>t</sup> )	
256	24-08-31	Ring	
257	24-08-03	Take-up reel table	
258	24-09-03	REW roller	
259	24-09-04	Lever	
260	21-09-03	Idler (2)	
261	24-09-02	Lever	
262	24-09-13	Washer	
263	24-09-31	Ring	
264	21-09-31	Ring	
265	21-09-32	Ring	
266	53-08-32	Oil seal washer	
267	21-09-42	Shaft	
268	24-09-41	Shaft	
269	24-09-62	Pulley	
270	N24-3040-41	E washer 4φ	
271		Nylon washer (6.2φ x 12φ x 0.3 <sup>t</sup> ) x 2	
272		Nylon washer (6.2φ x 12φ x 0.5 <sup>t</sup> ) x 2	
273		Nylon washer (7.1φ x 14φ x 0.3 <sup>t</sup> )	
274		Nylon washer (4.6φ x 17φ x 0.5 <sup>t</sup> )	
275		Nylon washer (4.9φ x 12φ x 0.5 <sup>t</sup> )	
276		Stop ring 7φ x 1 <sup>t</sup>	
277	24-09-81	Coil spring	
278	24-09-32	Oil seal washer	
279	24-10-01	Lever (6)	
280	24-10-13	Backtension (1)	
281	24-02-17	Washer x 2	
282	21-10-31	Lining	
283	42-11-51	Ring	
284	21-10-81	Coil spring x 2	
285	S32E45	Coil spring	
286	24-10-81	Tension ring	
287	N30-3012-16	Small pan head screw (3φ x 12)	
288	N40-3008-16	Flat head screw ⊖ (3φ x 8)	
289	N48-3012-11	Tapping screw (3φ x 12)	
290		Fiber washer (6.1φ x 14φ x 0.5 <sup>t</sup> ) x 2	
291	25-12-01	Lever (5)	
292	24-12-02	Idler (1)	
293	25-12-02	Lever (4)	
294	24-12-04	Arm	
295	25-12-13	Holder	
296	24-12-13	Lever	
297	24-12-16	Holder	
298	24-12-17	Washer	
299	25-12-17	Panel	
300	25-12-15	Stopper	



Ref. No.	Parts No.	Description	Remarks
301	49-10-31	Ring	
302	25-12-41	Pipe x 3	
303	24-12-42	Stud	
304	25-12-42	Stud	
305	24-12-52	Bearing	
306	24-12-55	Motor pulley	
307	24-12-56	Speed changeover shaft	
308	49-18-59	Ring 8 $\phi$	
309	25-12-61	Cam	
310	24-12-61	Speed changeover cam	
311	21-12-71	Round belt (1)	
312	24-12-81	Coil spring	
313	24-12-82	Coil spring	
314	S40G28	Coil spring	
315	N30-4008-11	Small pan head screw (4 $\phi$ x 8) x 2	
—			
317	N30-4016-16	Small pan head screw (4 $\phi$ x 16) x 3	
318	N77-4006-41	Set screw with hexagon hole (4 $\phi$ x 6) x 2	
319	N77-4008-41	Set screw with hexagon hole (4 $\phi$ x 8)	
320	N30-3010-11	Small pan head screw (3 $\phi$ x 10)	
321		Steel ball (8 $\phi$ )	
322		Flat washer (6 $\phi$ x 10 $\phi$ x 0.25 <sup>t</sup> )	
323		Flat washer (5 $\phi$ x 10 $\phi$ x 0.5 <sup>t</sup> )	
324		Flat washer (6 $\phi$ x 12 $\phi$ x 0.5 <sup>t</sup> )	
325		Flat washer (6 $\phi$ x 12 $\phi$ x 0.3 <sup>t</sup> )	
326		Steel ball (4.76 $\phi$ )	
327	24-13-01	Lever (7)	
328	25-13-11	Lever (8)	
329	23-13-42	Shaft	
330	23-13-41	Spoke	
331	42-11-52	Ring	
332	42-09-81	Spring	
333	S70H32	Spring	
334		Nut 2 $\phi$	
335	24-02-17	Washer	
336	24-14-42	Shaft	
337	24-14-62	Pulley	
338	24-14-91	Tape counter	
339		Flat washer (3 $\phi$ x 10 $\phi$ x 0.5 <sup>t</sup> ) x 2	
340		Nylon washer (3.5 $\phi$ x 8 $\phi$ x 0.5 <sup>t</sup> ) x 2	
341	N24-3023-60	Stop ring (2.3 $\phi$ )	
342	24-14-72	Round (2)	
343	24-14-73	Round (3)	
344	24-15-11	Plate nut	
345	25-15-42	Arm	
346	24-15-42	Shaft	
347	42-15-51	Pipe	
348	AM7901	Micro SW	
349	N30-2616-11	Small pan head screw (2.6 $\phi$ x 16)	
350		Nylon washer (2.7 $\phi$ x 5 $\phi$ x 0.3 <sup>t</sup> )	
351		E ring (1.9 $\phi$ )	
352	24-16-52	Tip (U)	
353	26-05-14	TAPE SELECTOR holder	

# PARTS LIST

\* In America add to the parts of (K), in other area do to the parts of (U).

Circuit No.	Parts No.	Description	Remarks
■	<b>A30-0081-01</b>	<b>Case assembly</b>	
■	<b>A70-0049-01</b>	<b>Panel assembly</b>	
—	B40-0489-04	Distination plate	
—	B42-0009-04	Passed sticker	
—	B42-0267-04	Caution sticker	
—	B46-0023-00	* Warranty card (U)	
—	B46-0022-00	* Warranty card (U)	
—	B46-0002-00	* Warranty card (K)	
—	B50-0622-00	* Instruction manual (K)	
—	B50-0663-00	* Instruction manual (U)	
—	B52-0095-00	Schematic diagram	
—	B58-0043-00	Caution card (at carton box)	
C401, C402	CP02B2J473M	Oil impregnated	
C403, 404	C90-0103-05	Phase advancer capacitor	
C405, 406	CK94YX1H471K	Ceramic 470PF ±10%	
—	D19-0026-04	Connecting plate	
■	<b>D40-0100-05</b>	* Mechanism assembly (K)	
■	<b>D40-0101-05</b>	* Mechanism assembly (U)	
—	E30-0004-05	Audio cord x 3	
■	<b>F08-0033-03</b>	<b>Housing assembly</b>	
—	F15-0045-04	Shutter x 2	
—	G16-0018-04	Reel sheet x 2	
—	G16-0015-04	Sheet A	
—	G16-0035-04	Sheet x 3	
—	G16-0036-04	Sheet F	
—	G16-0037-04	Sheet x 2	
—	H25-0078-00	Instruction bag	
—	J03-0012-04	Legs x 2	
■	<b>J09-0043-04</b>	<b>Standing legs assembly x 2</b>	
—	J11-0005-04	Reel crammer x 2	
—	J19-0092-04	Washer x 6 (for panel assembly)	
—	J21-0498-04	Mounting stopper	
—	J21-0807-04	Mounting stopper x 2	
—	J41-0005-04	Phone bushing x 3	
—	K20-0002-14	Knob (PLAY MODE)	
—	K20-0027-24	Knob C	
—	K21-0115-05	Control lever	
—	K23-0031-04	Speed change knob	
■	<b>K29-0004-04</b>	<b>Push-button assembly (POWER)</b>	
■	<b>K29-0012-04</b>	<b>Record button assembly x 2</b>	
—	K29-0025-34	Push-button (TAPE SELECTOR)	
—	K29-0026-14	Knob (MONITOR, phones SW) x 3	
—	L09-0094-05	Power transformer	
L401, 402	L33-0114-05	Ferri-inductor 8.2 mH	

Circuit No.	Parts No.	Description	Remarks
—	N09-0018-14	Set screw (for control lever)	
—	N15-1030-11	Flat washer	
—	N15-1040-11	Flat washer x 2	
—	N16-0040-41	Spring washer x 4	
—	N19-0002-04	Square washer x 2	
—	N30-3006-11	Pan head screw x 10	
—	N30-4006-11	Pan head screw x 18	
—	N30-4012-11	Pan head screw x 2	
—	N30-4020-11	Pan head screw x 2	
—	N35-3006-13	Binding screw x 7	
—	N73-4008-11	Set screw	
R401, 402	PD14BY2E182J	Insulated carbon film $1.8k\Omega \pm 5\%$ 1/4W	
—	S46-4001-05	Muting switch S6	
—	T40-0008-05	Motor	
—	W01-0028-15	Reel	
■	X25-1000-11	Amplifier assembly	

## KENWOOD ELECTRONICS, INC.

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